ANNEXURE A

Kanya Maha Vidyalaya, Jalandhar City
(An Autonomous College)

Minutes of 8th Meeting of Board of Studies

PG Department of Zoology

Date: 12-06-2023

Time: 11:30 AM

Via Zoom video conferencing

KANYA MAHA VIDYALAYA, JALANDHAR
(UGC Autonomous College)
P.G. Department of Zoology
Proceedings of the Eighth Meeting of Board of Studies held on 12-06-2023

The Eighth meeting of the board of studies was held in online mode via Zoom on June 12, 2023 at 11:30 am.

Date: 12-06-2023 (Monday)

Time: 11:30 AM

Venue: Online meeting via Zoom

The following members have attended meeting and detailed minutes are listed below:

1.	**Dr. Archana Saini**, Assistant Professor & Head, Dept. of Zoology, KMV, Jalandhar.	**Chairperson**	Present
2.	**Dr. Arvinder Kaur**, Professor, Department of Zoology, GNDU, Amritsar.	**VC Nominee**	Present
3.	**Dr Jyoti Parkash**, Assistant Professor, Department of Zoology, Central University, Bathinda	Outside GNDU Nominee	Absent
4.	**Dr. Chander Prakash**, Assistant Professor, Dept. of Life Sciences, IK Gujral Punjab Technical University, Kapurthala	Outside GNDU Nominee	Present
5.	**Mr Jaswant Singh Tiwana,** CEO**,** Tiwana bee Farm, Doraha, Ludhiana	Industry Partner	Absent
6.	**Dr Prabha,** Assistant Professor, Dept. of Zoology, KMV, Jalandhar.	Alumni	Present
7.	**Dr. Mandeep Kaur**, Assistant Professor, Dept. Of Zoology, KMV, Jalandhar.	Member	Present

The Eighth meeting of Board of Studies of PG department of Zoology started with welcome address by the Chairperson Dr Archana Saini. She apprised the members about the programmes in the department along with teaching and research strengths of the department. She took up the agenda items for deliberations one by one with the permission of committee members.

ZOO: 2023: 8: 1: To discuss and approve the minutes of Board of Studies VII (dated 22-04-2022) and Action Taken Report.

Proceedings: The chairperson sent the proceedings of the previous Board of Studies meeting held on 22th April 2022 through email to all the members and were approved by all the members. The Chairperson however again put up the summary of the proceedings for approval of the house and they approved it through Zoom meeting **(Attached herewith as Annexure A)**.

Action Taken Report of Board of Studies Meeting VII

S. No.	Agenda Item	Decision taken in Meeting	Action Taken
Item: ZOO: 2022: 7: 3	To discuss the proposed syllabus and course outcomes of Zoology in **B. Sc. (Medical), Semester I - VI** under continuous evaluation System for the session 2022-25.	The syllabus and course outcomes of **B. Sc. (Medical) Semester I-VI** under continuous evaluation system for session 2022-25, was discussed by the members and they approved it without any change.	The approved syllabus is executed
Item: ZOO: 2022: 7: 4	To discuss the proposed syllabus and course outcomes of **M. Sc. (Zoology) Sem III - IV** Under continuous Evaluation System for the session 2022-23.	The syllabus and course outcomes of **M. Sc. (Zoology) Semester III-IV** under continuous evaluation system for session 2022-23, was discussed by the members and they approved it without any change	The approved syllabus is executed

Item: ZOO: 2022:7: 5	To discuss the proposed syllabus and course outcomes of **M. Sc. (Zoology) Sem I - IV** Under Credit based Evaluation System for the session 2022-24.	Chairperson Mrs. Sadhana Tandon discussed in details the introduction of credit based continuous evaluation grading system (CBCEGS) for M.Sc. Zoology for the session 2022-24. The following points were highlighted and discussed and approved. Overall M. Sc. Zoology for session 2022-24 will have **111 credits with 103 mandatory and 8 Inter Disciplinary.** But the credits of Inter disciplinary courses will not be added in calculation of SGPA/CGPA. These will be qualifying courses only grades will be assigned.	The approved syllabus is executed
Item: ZOO: 2022:7: 6	To discuss the proposed syllabus and course outcomes of paper **Biology for Chemists** of **Sem II** for class **M.Sc. Chemistry** Under Credit based Evaluation System for the session 2022-24.	Chairperson Mrs. Sadhana Tandon discussed start of credit based continuous evaluation grading system for Paper **Biology of Chemists** of **M.Sc. Chemistry** for the session 2022-24. The following points were highlighted, discussed and approved.	The approved syllabus is executed
Item: ZOO: 2022:7: 7	To discuss the proposed syllabus and course outcomes	The syllabus and course outcomes of **Cell Biology** for class **B. Sc. (Biotechnology) Semester I** under continuous evaluation system for	The approved syllabus is executed

	of **Cell Biology** for Class **B.Sc. Biotechnology Semester I** under Continuous Evaluation System for the session 2022-23.	session 2022-23, was discussed by the members and they approved it without any change.	
Item: ZOO: 2022:7: 8	To discuss the proposed syllabus and course outcomes of **Zoology-I** for Class **B. Sc. Biotechnology Semester II** under Continuous Evaluation System for the session 2022-23.	The syllabus and course outcomes of **Zoology- I** for class **B.Sc. (Biotechnology) Semester II** under continuous evaluation system for session 2022-23, was discussed by the members and they approved it without any change	The approved syllabus is executed
Item: ZOO: 2022:7: 9	To discuss the proposed syllabus and course outcomes of **Zoology-II** for Class **B. Sc. Biotechnology Semester IV** under Continuous	The syllabus and course outcomes of **Zoology- II** for class **B. Sc. (Biotechnology) Semester IV** under continuous evaluation system for session 2022-23, was discussed by the members and they approved it without any change	The approved syllabus is executed

	Evaluation System for the session 2022-23.		
Item: ZOO: 2022:7: 10	To discuss the proposed syllabus and course outcomes of **Applied Zoology and Food Microbiology** for Class **B. Sc. Home Science Semester VI** under Continuous Evaluation System for the session 2022-23.	The syllabus and course outcomes of **Applied Zoology and Food Microbiology** for class **B. Sc. (Home Science) Semester VI** under continuous evaluation system for session 2022-23, was discussed by the members and they approved it without any change	The approved syllabus is executed
Item: ZOO: 2022: 7: 11	To discuss the proposed syllabus and course outcomes of paper of **Environmental Studies** of **Semester III** for Class B.Sc. (Medical, Non-Medical, Biotechnology, Computer	The syllabus and course outcomes of **Environmental Studies** for class B.Sc. (Medical, Non-Medical, Biotechnology, Computer Science, Home Science)/ B. Com. (Regular, Hons)/ B. Sc. (Hons) Agriculture, B. Sc. (Hons) Mathematics)/ BBA/ BCA under continuous evaluation system for session 2022-23, was discussed by the members and they approved it without any change	The approved syllabus is executed

	Science, Home Science)/ B. Com. (Regular, Hons)/ B. Sc. (Hons) Agriculture, B. Sc. (Hons) Mathematics)/ BBA/ BCA under Continuous Evaluation System for the session 2022-23.		
Item: ZOO: 2022: 7: 12	To discuss the proposed syllabus and course outcomes of paper of **Environmental Studies** of **Semester IV** for Class B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English, B. Voc. (Retail Management,	The syllabus and course outcomes of **Environmental Studies** for class B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English, B. Voc. (Retail Management, Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness) under Continuous Evaluation and credit-based System for session 2022-23, was discussed by the members and they approved it without any change.	The approved syllabus is executed

	Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness) under Continuous Evaluation and credit-based System for the session 2022-23.		
Item: ZOO: 2022: 7: 13	To discuss the proposed syllabus and course outcomes of certificate course on **Pet Keeping** Under Credit based Evaluation System for the session 2022-23.	The BOS members were of the view that this course comes under veterinary sciences and a consensus could not be made.	The syllabus is not executed
Item: ZOO: 2022: 7: 14	To discuss and approve the list of proposed	The chairperson discussed the Examiners and Evaluators for above stated courses with the members	List of Examiners was sent to

	examiners for above stated courses.		COE Office.
Item: ZOO: 2022: 7: 15	To discuss research inputs and plans of department for session 2022-23.	Mrs. Sadhana Tandon apprised the committee members about the research activities taken by department. She explained that department has five Ph. D. teachers, one M. Phil, two M. Sc teachers. Faculty members are engaged in quality research as evident from their publications in high impact factor journals of International and National repute. She apprised that Department has all major sophisticated instruments all supported from project grants like DBT star College, CPE & FIST from DST. Teachers also participated in online webinars, FDPs, Induction and refresher course conducted by various institutions	Faculty members are engaged in quality research as evident from their publications in high impact factor journals of International and National repute.
Item: ZOO: 2022: 7: 16	To discuss teaching methodologies adopted in department and inputs required to upgrade the same.	The teaching methodologies adopted in department were approved by the house.	BOS member appreciated the innovative teaching methodologies adopted by department.

The house approved the Item: ZOO: 2023: 8: 1

ZOO: 2023: 8: 2: To discuss the proposed syllabus of Zoology in **B. Sc. (Medical) Sem I -II** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.

Proceedings: The house discussed and approved the following:

1. **In Bachelor of Science (Medical)** Semester I to II under Credit Based Continuous Evaluation Grading System (CBCEGS) for session 2023-24, **Zoology** subject will have 7 credits in each semester. It was decided to add 20% internal assessment in all papers of **Bachelor of Science (Medical)** Semester I and II under Credit Based Continuous Evaluation Grading System (CBCEGS) for session 2023-24.
2. The content of the syllabus was approved without any changes.
3. The course scheme approved for B. Sc. (Medical) Sem I-II under Credit Based Continuous Evaluation Grading System for the session 2023-24 is as follows:

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**

(Approved syllabus attached herewith as Annexure A).

The house approved the Item: ZOO: 2023: 8: 2

ZOO: 2023: 8: 3: The syllabus of Zoology in **B. Sc. (Medical) Sem III -VI** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **B. Sc. (Medical) Sem III -VI** under Continuous Evaluation System with 20% internal assessment for session 2022-23, was approved by the members without any change (Approved syllabus attached herewith as Annexure B).

The house approved the Item: ZOO: 2023: 8: 3

ZOO: 2023: 8: 4: To discuss the proposed syllabus of **M. Sc. (Zoology) Sem I - II** Under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.

Proceedings: Chairperson Dr. Archana Saini discussed in details the introduction of credit based continuous evaluation grading system (CBCEGS) with 30% internal assessment for M.Sc. Zoology for the session 2023-24. The following points were highlighted and discussed:

1) Master of Science (Zoology) Semester I and II for session 2023-24 will have 43 credits.
2) Inter Disciplinary subjects offered will be optional and only grades will be assigned.
3) It was decided to add 20% internal assessment in all papers of Master of Science and the content of the syllabus was approved without any changes.

The course scheme for credits is as follows:

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Master of Science (Zoology)

Session 2023-24

Master of Science (Zoology) Semester-I										
Course Code	**Course Name**	**Course Type**	**Hours Per Week**	**Credits**	**Total Credits**	**Marks**				**Examination time (in hours)**
						Ext.		**CA**	**Total**	
				L-T-P		**L**	**P**			
MZOL-1481	Functional Organization of Animals–I	C	4	4-0-0	4	80	-	20	100	3
MZOL-1482	Animal Ecology	C	4	4-0-0	4	80	-	20	100	3
MZOL-1483	Cell Biology	C	4	4-0-0	4	80	-	20	100	3
MZOL-1484	Concepts of Biotechnology	C	4	4-0-0	4	80	-	20	100	3
MZOM-1135	Computer Programming and Data Processing	C	4	2-0-1	3	40	20	15	75	3+3
MZOP-1486	Practical-I (Functional Organization of Animals-I)	C	4	0-0-2	2	-	40	10	50	3
MZOP-1487	Practical-II (Ecology and Cell Biology)	C	4	0-0-2	2	-	40	10	50	3
Students can opt any one of the following interdisciplinary **optional** courses		**IDE**			4	80		20	100	3
				Total	**23**				**575**	

IDEC-1101 IDEM-1362 IDEH-1313 IDEI-1124 IDEW-1275	• Communication Skills • Basics of Music (Vocal) • Human Rights and Constitutional Duties • Basics of Computer Applications • Indian heritage: Contribution to the World

IDE – Inter Disciplinary Elective/ optional Course

***Credits/ Grade points of these courses will not be included in the SGPA/CGPA of semester.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Master of Science (Zoology)

Session 2023-24

Master of Science (Zoology) Semester-II										
Course Code	**Course Name**	**Course Type**	**Hours Per Week**	**Credits**	**Total Credits**	**Marks**				**Examination time (in hours)**
						Ext.		**CA**	**Total**	
				L-T-P		**L**	**P**			
MZOL-2481	Functional Organization of Animals–II	C	4	4-0-0	4	80	-	20	100	3
MZOL-2482	Applied Zoology-I (Invertebrates)	C	4	4-0-0	4	80	-	20	100	3
MZOL-2483	Evolution	C	2	2-0-0	2	40	-	10	50	3
MZOL-2334	Biostatistics	C	4	4-0-0	4	80	-	20	100	3
MZOS-2485	Seminar	C	4	0-0-2	2	-	40	10	50	3
MZOP-2486	Practical-III (Functional Organization of Animals–II)	C	4	0-0-2	2	-	40	10	50	3
MZOP-2487	Practical- IV (Evolution and Applied Zoology-I)	C	4	0-0-2	2	-	40	10	50	3
Total					**20**				**500**	

(Approved syllabus attached herewith as Annexure C)

The house approved the Item: ZOO: 2023: 8: 4

ZOO: 2023: 8: 5: The syllabus of **M. Sc. (Zoology) Sem III - IV** for the session 2023-24 will remain the same as the session 2022-23 under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **M. Sc. (Zoology) Sem III -IV** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment for session 2022-23, was approved by the members without any change

The IDE in Master of Science (Chemistry) Semester III which was previously compulsory will now be optional (scheme attached).

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Session 2023-24

Master of Science (Zoology) **Semester-III**										
Course Code	**Course Name**	**Course Type**	**Hours Per Week**	**Credits**	**Total Credits**	**Marks**				**Examination time (in hours)**
						Ext.		**CA**	**Total**	
				L-T-P		**L**	**P**			
MZOL-3481	Research Techniques and Methodology	C	4	4-0-0	4	80	-	20	100	3
MZOL-3482	Developmental Biology-I	C	4	4-0-0	4	80	-	20	100	3
MZOL-3483	General Biochemistry	C	4	4-0-0	4	80	-	20	100	3
MZOL-3484	Applied Zoology-II(Vertebrates)	C	4	4-0-0	4	80	-	20	100	3
MZOP-3485	Practical –V (Research Techniques and Applied Zoology-II)	C	6	0-0-3	3	-	40	10	50	3
MZOP-3486	Practical VI (Developmental Biology and Biochemistry)	C	6	0-0-3	3	-	40	10	50	3
Students can opt any one of the following interdisciplinary optional courses. The ID Course opted in SEM-I cannot be opted in SEM – III.		**IDE**			4	80		20	100	
			Total		**26**				**500**	

IDEC - 3101 IDEM -3362 IDEH -3313 IDEI - 3124 IDEW-3275	• Communication Skills • Basic Music (Vocal) • Human Rights and Constitutional Duties • Basics of Computer Applications • Indian heritage: Contribution to the World

IDE – Inter Disciplinary Elective/ Optional Course

***Credits/ Grade points of these courses will not be included in the SGPA/CGPA of semester.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME
(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)
Session 2023-24

Master of Science (Zoology)
Semester-IV

Course Code	Course Name	Course Type	Hours Per Week	Credits	Total Credits	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MZOL-4481	Animal Behavior and Wildlife Conservation	C	4	4-0-0	4	80	-	20	100	3
MZOL-4482	Molecular Genetics	C	4	4-0-0	4	80	-	20	100	3
MZOL-4483	Concepts of Immunology	C	4	4-0-0	4	80	-	20	100	3
MZOL-4484	Developmental Biology- II	C	4	4-0-0	4	80	-	20	100	3
MZOL-4485	Biosystematics	C	4	4-0-0	4	80	-	20	100	3
MZOP-4486	Practical–VII (Animal Behavior and Wildlife Conservation)	C	6	0-0-3	3	-	40	10	50	3
MZOP-4487	Practical–VIII (Genetics and Biosystematics)	C	6	0-0-3	3	-	40	10	50	3
MZOD-4488	Project	C	6	0-0-3	3	-	40	10	50	3

Total					**32**				**650**	

(Approved syllabus attached herewith as Annexure D)

The house approved the Item: ZOO: 2023: 8: 5

ZOO: 2023: 8: 6: To discuss the proposed syllabus of paper **Biology for Chemists** of **Sem II** for class **M. Sc. Chemistry** Under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.

Proceedings: Chairperson Dr. Archana Saini discussed in details about credit based continuous evaluation grading system (CBCEGS) with 30% internal assessment for Paper **Biology of Chemists** of **M.Sc. Chemistry** for the session 2023-24. The following points were highlighted and discussed and approved

1. The course for session 2023-24 will have 2 credits.
2. It was decided to add 20% internal assessment in this paper and the content of the syllabus was approved without any changes.
3. The course scheme for credits is as follows:

Master of Science (Chemistry)

Semester-II

Course Code	Course Name	Course Type	Hours Per Week	Credits	Total Credits	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MCHL-2056	Biology for Chemists	C	2	2-0-0	2	40	-	10	50	3

(Approved syllabus attached herewith as Annexure E)

The house approved the Item: ZOO: 2022: 7: 6

ZOO: 2023: 8: 7: To discuss the proposed syllabus of **Cell Biology** for Class **B.Sc. Biotechnology Semester I** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.

Proceedings: The syllabus and course outcomes of **Cell Biology** and **Lab in Cell Biology** for class **B. Sc. (Biotechnology) Semester I** under Credit Based Continuous Evaluation Grading System (CBCEGS) for session 2023-24 were discussed and the following points were highlighted and and approved

1. The course for session 2023-24 will have 4.5 credits in Semester I and the content of the syllabus was approved without any changes.
2. It was decided to add 20% internal assessment
3. The course scheme for credits is as follows:

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Session-2023-24

Bachelor of Science (Biotechnology) Semester I										
Course Code	**Course Title**	**Course type**	**Credits**		**Total credits**	**Marks**				**Examination time (Hours)**
			L	**P**		**L**	**P**	**CA**	**Total**	
BBTL-1483	Cell Biology	C	3	0	3	40	-	10	50	3
BBTP-1488	Lab in Cell Biology	C	0	1.5	1.5	-	20	5	25	3

(Approved syllabus attached herewith as Annexure F)

The house approved the Item: ZOO: 2023: 8: 7

ZOO: 2023: 8: 8: To discuss the proposed syllabus of **Zoology-I** for Class **B. Sc. Biotechnology Semester II** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.

Proceedings: The syllabus and course outcomes of **Zoology I** and **Lab in Zoology I** for class **B.Sc. (Biotechnology) Semester II** under Credit Based Continuous Evaluation Grading System (CBCEGS) for session 2023-24 were discussed. The following points were highlighted and approved. The course for session 2023-24 will have 4.5 credits in semester I.

1. It was decided to add 20% internal assessment and the content of the syllabus was approved without any changes.
2. The course scheme for credits is as follows:

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Session-2023-24

Bachelor of Science (Biotechnology) Semester II

Course Code	Course Title	Course type	Credits		Total credits	Marks				Examination time (Hours)
			L	P		L	P	CA	Total	
BBTL-2484	Zoology-I	C	3	0	3	40	-	10	50	3
BBTP-2488	Lab in Zoology-I	C	0	1.5	1.5	-	20	5	25	3

(Approved syllabus attached herewith as Annexure G)

The house approved the Item: ZOO: 2023: 8: 8

ZOO: 2023: 8: 9: The syllabus of **Zoology-II** for Class **B. Sc. Biotechnology Semester IV** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **Zoology- II** for class **B. Sc. (Biotechnology) Semester IV** under Continuous Evaluation System with 20% internal assessment for session 2022-23, was approved by the members without any change (Approved syllabus attached herewith as Annexure H)

The house approved the Item: ZOO: 2023: 8: 9

ZOO: 2023: 8: 10: The syllabus of **Applied Zoology and Food Microbiology** for Class **B. Sc. Home Science Semester VI** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **Applied Zoology and Food Microbiology** for class **B. Sc. (Home Science) Semester VI** under continuous evaluation system with 20% internal assessment for session 2022-23, was approved by the members without any change (Approved syllabus attached herewith as Annexure I).

The house approved the Item: ZOO: 2023: 8: 10

ZOO: 2023: 8: 11: The syllabus of paper of **Environmental Studies** of **Semester III** for Class B.Sc. (Medical, Non-Medical, Biotechnology, Computer Science, Home Science)/ B. Com. (Regular, Hons), B. Sc. (Hons) Mathematics)/ BBA/ BCA for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **Environmental Studies** for class B.Sc. (Medical, Non-Medical, Biotechnology, Computer Science, Home Science)/ B. Com. (Regular,

Hons)/ B. Sc. (Hons) Agriculture, B. Sc. (Hons) Mathematics)/ BBA/ BCA under continuous evaluation system with 20% internal assessment for session 2022-23, was approved by the members without any change (Approved syllabus attached herewith as Annexure J)

The house approved the Item: ZOO: 2023: 8: 11

ZOO: 2023: 8: 12: The syllabus of paper of **Environmental Studies** of **Semester IV** for Class B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.

The syllabus of paper of **Environmental Studies** of **Semester IV** for Class B. Voc. (Retail Management, Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness) for the session 2023-24 will remain the same as the session 2022-23 under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment and has already been approved.

Proceedings: The syllabus and course outcomes of **Environmental Studies** for class B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and was approved by the members without any change

The syllabus and course outcomes of **Environmental Studies** for class B. Voc. (Retail Management, Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness) for the session 2023-24 will remain the same as the session 2022-23 under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment and was approved by the members without any change (Approved syllabus attached herewith as Annexure K)

ZOO: 2023: 8: 13: To discuss and approve the list of proposed examiners for above stated courses.

Proceedings: The chairperson discussed the Examiners and Evaluators for above stated courses with the members **(Lists attached herewith in Annexures along with syllabus).**

The house approved the Item: ZOO: 2023: 8: 13

ZOO: 2023: 8: 14: To discuss and approve the ordinances of B. Sc. (Medical) and M. Sc. (Zoology) programme.

Proceedings: The ordinance of Bachelor of Science and Master of Science (Zoology) programmes was discussed and approved by the BOS members. **(Lists attached herewith as Annexure L).**

The house approved the Item: ZOO: 2023: 8: 14

ZOO: 2023: 8: 15: To discuss research inputs and plans of department for session 2023-24.

Proceedings: Dr Archana Saini apprised the committee members about the research activities taken by department. She explained that department has five Ph. D. and Two M. Sc. teachers. Faculty members are engaged in quality research which is evident from their publications in journals of high repute. In the session 2022-23 the faculty of Zoology has published **07** research papers in Scopus indexed / UGC approved Journals, **12** book chapters in edited books and **02** edited books. PG dept of Zoology has high end sophisticated instruments including Trinocular microscopes, BOD Analyser, Thermal Cycler, Gel Doc, nanodrop spectrophotometer etc. Our department is supported by various grants like DBT Star Status, CPE, FIST Phase I & II and CURIE Grant by DST Govt of India. The faculty of Zoology also participate in conferences, webinars, FDPs, Induction Programs and Refresher courses to update their skills. During last session whole faculty has participated in **21** such events. In the session 22-23 one of the Dept. faculty Dr Archana Saini has organized a two-day national conference as Co-coordinator on Implementation of NEP 2020 and role of scientific & technical terminology on 29-30 Nov. 2022 KMV campus in collaboration & funding from Commission for Scientific & Technical terminology (CSTT) Ministry of Education, Govt. of India. All the faculty members of Zoology also undertake major projects (externally funded) / minor seed money projects (funded by college) from time to time to engage their MSc students in research work and enhance their research aptitude. Our M. Sc. Sem IV students also take up small research projects as part of their curriculum and submit their research dissertations after successful completion of viva by external examiners.

The house highly appreciated the efforts done by faculty to organize different events. They also admired the research initiatives of the department like minor research projects done by students and seed money projects undertaken by the faculty.

The house approved the Item: ZOO: 2023: 8: 15

ZOO: 2023: 8: 16: To discuss teaching methodologies adopted in department and inputs required to upgrade the same.

Proceedings: Dr Archana Saini apprised all members with innovative teaching methodologies adopted by the department. BOS member appreciated the innovative teaching methodologies adopted by department like ICT based teaching through ppts, educational videos, projects,

assignments & seminars to inculcate critical & creative thinking in students, Other highlights of department include student- student mentoring, group discussions, student mentoring by teachers & remedial classes for weak students. The Department is well equipped with smart class rooms, e-content and demonstrations for better understanding of concepts. Department has well equipped laboratories and enriched departmental. library. Invited Talks by luminaries across the globe is a regular feature of the department and activities like workshops, power point presentation competitions, social outreach, educational trips and environment related activities are regularly organized for overall development of students and to create passion for science.

The house approved the (Item: ZOO: 2023: 8: 16) teaching methodologies and various activities held in the department to enhance teaching learning process.

ZOO: 2023: 8: 17: To discuss the outcome of above stated courses and programs.

Proceedings: The chairperson discussed the outcomes for above stated courses with the **(Lists attached herewith in Annexures along with syllabus).**

The house approved the Item: ZOO: 2023: 8: 17

ZOO: 2023: 8: 18: To discuss the result analysis for the session 2022-23.

Proceedings: The chairperson discussed the result analysis of different classes with the members and BOS members appreciated the result of all classes. **(Lists attached herewith as Annexure M).**

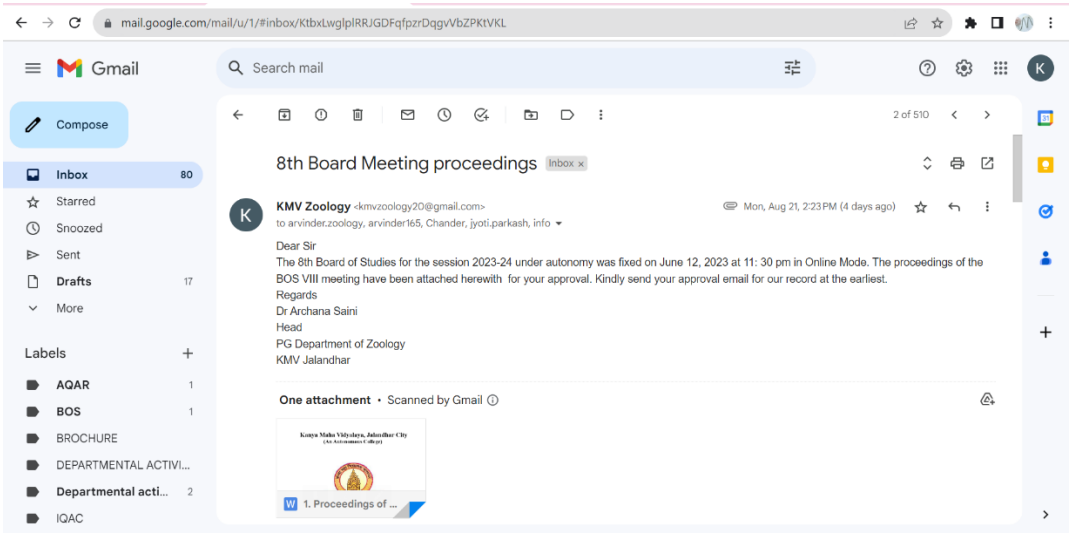
The house approved the Item: ZOO: 2023: 8: 18

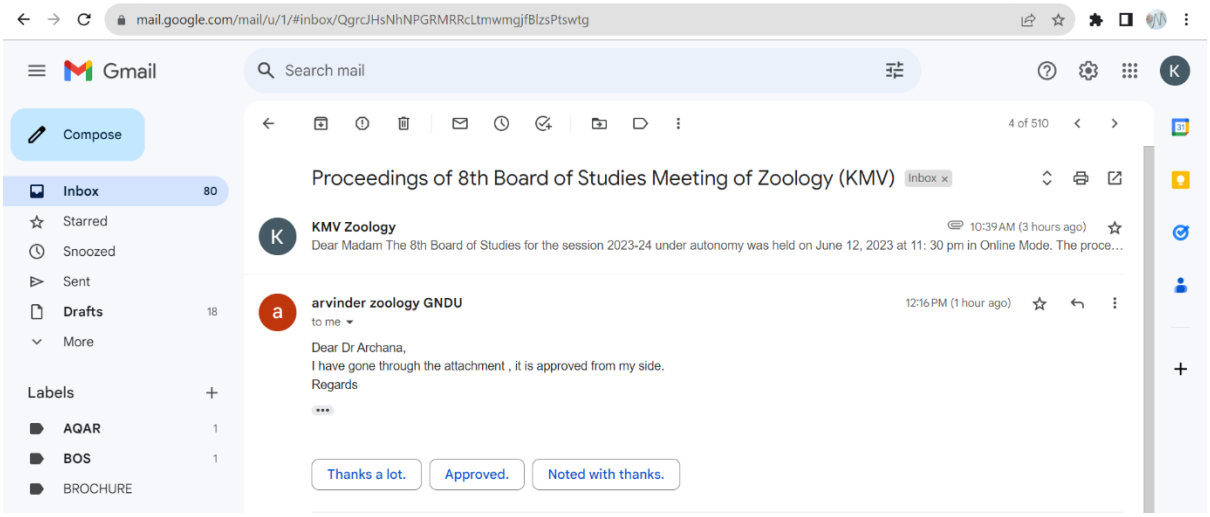
Dr. Arvinder Kaur (VC Nominee)	**Dr Jyoti Parkash (Outside GNDU Nominee)**	**Dr Chander Prakash (Outside GNDU Nominee)**
Mr Jaswant Singh Tiwana (Industry Partner)	**Dr Prabha (Alumni)**	**Dr. Archana Saini (Head of the Department, KMV)**

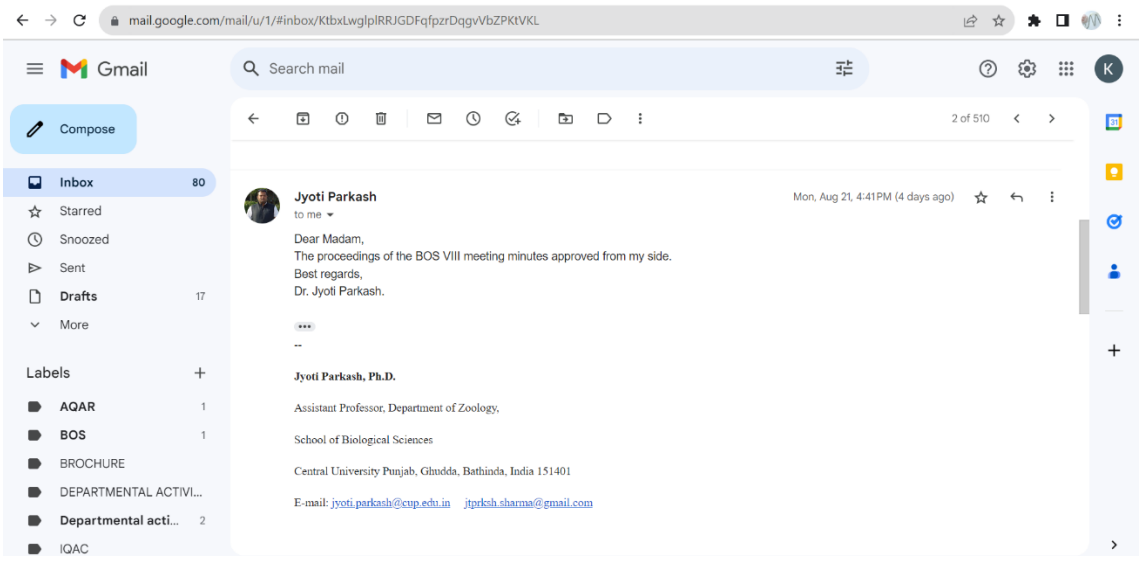
Dr. Mandeep Kaur

(Assistant Professor, KMV)

Approval of BOS members






mail.google.com/mail/u/1/#inbox/KtbxLwglplRRJGDFqfpzrDqgvVbZPKtVKL
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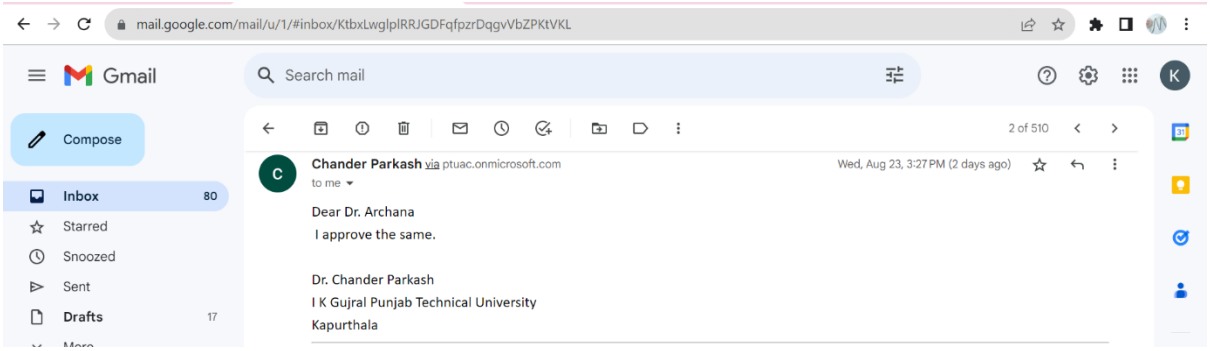
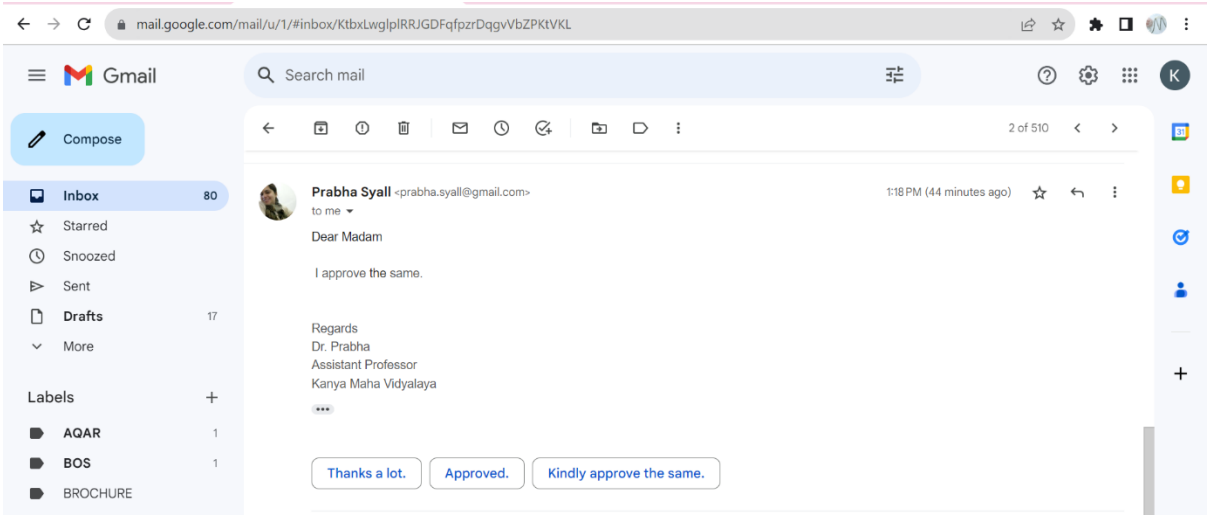
AQAR 1
BOS 1
BROCHURE
DEPARTMENTAL ACTIVI...
Departmental acti... 2
IQAC
2 of 510
Jyoti Parkash
to me
Mon, Aug 21, 4:41PM (4 days ago)
Dear Madam,
The proceedings of the BOS VIII meeting minutes approved from my side.
Best regards,
Dr. Jyoti Parkash.
--
Jyoti Parkash, Ph.D.
Assistant Professor, Department of Zoology,
School of Biological Sciences
Central University Punjab, Ghudda, Bathinda, India 151401
E-mail: jyoti.parkash@cup.edu.in jtprksh.sharma@gmail.com


mail.google.com/mail/u/1/#inbox/KtbxLwglplRRJGDFqfpzrDqgvVbZPKtVKL
Gmail
Search mail
Compose
Inbox 80
Starred
Snoozed
Sent
Drafts 17
2 of 510
Chander Parkash via ptuac.onmicrosoft.com
to me
Wed, Aug 23, 3:27PM (2 days ago)
Dear Dr. Archana
I approve the same.
Dr. Chander Parkash
I K Gujral Punjab Technical University
Kapurthala


mail.google.com/mail/u/1/#inbox/KtbxLwglplRRJGDFqfpzrDqgvVbZPKtVKL
Gmail
Search mail
Compose
Inbox 80
Starred
Snoozed
Sent
Drafts 17
More
Labels
AQAR 1
BOS 1
BROCHURE
2 of 510
Prabha Syall <prabha.syall@gmail.com>
to me
1:18PM (44 minutes ago)
Dear Madam
I approve the same.
Regards
Dr. Prabha
Assistant Professor
Kanya Maha Vidyalaya
Thanks a lot.
Approved.
Kindly approve the same.

ATR of BOS VIII

S. No.	Agenda Item	Decision taken in Meeting	Action Taken
ZOO: 2023: 8: 2	To discuss the proposed syllabus of Zoology in **B. Sc. (Medical) Sem I -II** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-26.	The syllabus and course outcomes of **B. Sc. (Medical) Semester I-II** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-26, was discussed by the members and they approved with 20% internal assessment.	The approved syllabus is executed
ZOO: 2023: 8: 3	The syllabus of Zoology in **B. Sc. (Medical) Sem III -VI** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.	The syllabus and course outcomes of **B. Sc. (Medical) Sem III -VI** under continuous evaluation system for session 2023-24, was approved by members without any change	The approved syllabus is executed
ZOO: 2023: 8: 4	To discuss the proposed syllabus of **M. Sc. (Zoology) Sem I - IV** Under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-25.	The syllabus and course outcomes of **M. Sc. (Zoology) Sem I - IV** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-25, was discussed by the members and they approved with 20% internal assessment.	The approved syllabus is executed
ZOO:	The syllabus of **M. Sc.**	The syllabus and course outcomes	The

2023: 8: 5	**(Zoology) Sem III - IV** for the session 2023-24 will remain the same as the session 2022-23 under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment and has already been approved.	of **M. Sc. (Zoology) Sem III - IV** under Credit Based Continuous Evaluation Grading System (CBCEGS)for session 2023-24, was approved by members without any change.	approved syllabus is executed
ZOO: 2023: 8: 6	To discuss the proposed syllabus of paper **Biology for Chemists** of Sem II for class M. Sc. Chemistry Under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.	The syllabus and course outcomes of paper **Biology for Chemists** for class **M. Sc. Chemistry Sem II** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24, was discussed by the members and they approved with 20% internal assessment.	The approved syllabus is executed
ZOO: 2023: 8: 7	To discuss the proposed syllabus of **Cell Biology** for Class **B.Sc. Biotechnology Semester I** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.	The syllabus and course outcomes of paper **Cell Biology** for class **B. Sc. Biotechnology Sem I** under Credit Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24, was discussed by the members and they approved with 20% internal assessment.	The approved syllabus is executed
ZOO: 2023: 8: 8	To discuss the proposed syllabus of **Zoology-I** for Class **B. Sc. Biotechnology Semester II** under Credit	The syllabus and course outcomes of paper **Zoology-I** for class **B. Sc. Biotechnology Sem II** under Credit Based Continuous Evaluation	The approved syllabus is executed

	Based Continuous Evaluation Grading System (CBCEGS) with 30% internal assessment for the session 2023-24.	Grading System (CBCEGS) with 30% internal assessment for the session 2023-24, was discussed by the members and they approved with 20% internal assessment.	
ZOO: 2023: 8: 9	The syllabus of **Zoology-II** for Class **B. Sc. Biotechnology Semester IV** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.	The syllabus and course outcomes of **Zoology- II** for class **B. Sc. Biotechnology Semester IV** under continuous evaluation system for session 2023-24, was approved by members without any change.	The approved syllabus is executed
ZOO: 2023: 8: 10	The syllabus of **Applied Zoology and Food Microbiology** for Class **B. Sc. Home Science Semester VI** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.	The syllabus and course outcomes of **Applied Zoology and Food Microbiology** for class **B. Sc. Home Science Semester VI** under continuous evaluation system for session 2023-24, was approved by members without any change.	The approved syllabus is executed
ZOO: 2023: 8: 11	The syllabus of paper of **Environmental Studies** of **Semester III** for Class **B.Sc. (Medical, Non-Medical, Biotechnology, Computer Science, Home Science)/ B. Com. (Regular, Hons), B.**	The syllabus and course outcomes of **Environmental Studies** for class B.Sc. (Medical, Non-Medical, Biotechnology, Computer Science, Home Science)/ B. Com. (Regular, Hons)/ B. Sc. (Hons) Mathematics)/ BBA/ BCA under continuous	The approved syllabus is executed

	Sc. (Hons) Mathematics)/ BBA/ BCA for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved.	evaluation system for session 2023-24, was approved by members without any change.	
ZOO: **2023: 8: 12**	The syllabus of paper of **Environmental Studies** of **Semester IV** for Class **B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English** for the session 2023-24 will remain the same as the session 2022-23 under Continuous Evaluation System with 20% internal assessment and has already been approved. The syllabus of paper of **Environmental Studies** of **Semester IV** for Class **B. Voc. (Retail Management, Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness)** for the	The syllabus and course outcomes of **Environmental Studies** for class **B.A. / B.A. (Journalism and Mass Communication) / B. Sc. (Fashion Designing) /B.A (Hons.) English, B. Voc. (Retail Management, Management and Secretarial Practices, Animation, Textile Designing and Apparel Technology, Nutrition, Exercise and Health, Beauty & Wellness)** under Continuous Evaluation and credit-based System for session 2023-24, was approved by members without any change.	The approved syllabus is executed

	session 2023-24 will remain the same as the session 2022-23 under Credit Based Continuous Evaluation Grading System (CBCEGS) with 20% internal assessment and has already been approved.		
ZOO: 2023: 8: 13	To discuss and approve the list of proposed examiners for above stated courses.	The chairperson Dr Archana Saini discussed the Examiners and Evaluators for above stated courses with the members.	List of Examiners was sent to COE Office.
ZOO: 2023: 8: 14	To discuss and approve the ordinances of B. Sc. (Medical) and M. Sc. (Zoology) programme.	The chairperson discussed ordinances of B. Sc. (Medical) and M. Sc. (Zoology) programme the with the members.	Ordinances are sent to COE office
ZOO: 2023: 8: 15	To discuss research inputs and plans of department for session 2023-24.	The chairperson apprised the committee members about the research activities taken by department. She explained that department has five Ph. D. teachers, two M. Sc teachers. Faculty members are engaged in quality research as evident from their publications in high impact factor journals of International and National repute. She apprised that Department has all major sophisticated instruments all supported from project grants like DBT star College, FIST and CURIE from DST. Teachers also	Faculty members are engaged in quality research as evident from their publications in high impact factor journals of International and

		participated in online webinars, FDPs, Induction and refresher course conducted by various institutions	National repute.
ZOO: 2023: 8: 16	To discuss teaching methodologies adopted in department and inputs required to upgrade the same.	The teaching methodologies adopted in department were approved by the house.	BOS member appreciated the innovative teaching methodologies adopted by department.
ZOO: 2023: 8: 17	To discuss the outcome of above stated courses and programs.	The chairperson discussed the course outcomes of above stated courses and programs with the members	List of course and programe outcomes was sent to COE Office.
ZOO: 2023: 8: 18	To discuss the result analysis for the session 2022-23.	The chairperson discussed the result analysis of all programs with the members. They appreciated the result of department.	Result analysis is sent COE and IQAC office.

ANNEXURE B

FACULTY OF LIFE SCIENCES

Syllabus for the

Subject: Zoology

For the award of the Degree in

Bachelor of Science (Medical)/ Honours

(Offered under 4- year UG Degree Programme)

(Credit Based Continuous Evaluation Grading System under NEP 2020)

(SEMESTER: I-VIII)

Session: 2024-25

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATION OF FOUR YEAR UNDER

GRADUATE DEGREE PROGRAMME

Session-2024-25

Bachelor of Science (Medical) Semester -I										
Course Name	**Course Code**	**Course Type**	**Paper**	**Credits L-T-P**	**Hours per week L-T-P**	**Total Marks**	**Marks**			**Exam Time in Hrs**
							L	**P**	**CA**	
Zoology	BSML-1483	DSC	Diversity of Nonchordates-I (Protozoa - Annelida)	4-0-0	4-0-0	100	80	-	20	3
	BSMP-1483	DSC	Nonchordates-I Lab	0-0-2	0-0-4	50	-	40	10	3
Bachelor of Science (Medical) Semester -II										
Zoology	BSML-2483	DSC	Diversity of Nonchordates-II (Arthropoda - Hemichordata)	4-0-0	4-0-0	100	80	-	20	3
	BSMP-2483	DSC	Nonchordates-II Lab	0-0-2	0-0-4	50	-	40	10	3
	BSMM-2480	SEC	Aquaculture	2-0-1	2-0-2	75	40	20	15	3+3
Bachelor of Science (Medical) Semester -III										
Zoology	BSML-3483	C	Diversity of Chordates	4-0-0	4-0-0	100	80	-	20	3
	BSMP-3483	C	Chordates Lab	0-0-2	0-0-4	50	-	40	10	3
Bachelor of Science (Medical) Semester -IV										
Zoology	BSML-4483	C	Cell Biology	4-0-0	4-0-0	100	80	-	20	3
	BSMP-4483	C	Cell Biology Lab	0-0-2	0-0-4	50	-	40	10	3
	BSMM-4480	SEC	Apiculture	2-0-1	2-0-2	75	40	20	15	3+3

Bachelor of Science (Medical) Semester -V										
Zoology	BSML-5483	C	Biomolecules	4-0-0	4-0-0	100	80	-	20	3
	BSMP-5483	C	Biomolecules Lab	0-0-2	0-0-4	50	-	40	10	3
Bachelor of Science (Medical) Semester -VI										
Zoology	BSML-6483	C	Animal Physiology	4-0-0	4-0-0	100	80	-	20	3
	BSMP-6483	C	Physiology Lab	0-0-2	0-0-4	50	-	40	10	3
	BSMM-6480	SEC	Medical Lab Technology	2-0-1	2-0-2	75	40	20	15	3+3
Bachelor of Science (Medical) Semester -VII										
Zoology	BSML-7481	C	Functional Organisation of Animals- I	3-0-0	3-0-0	75	60	-	15	3
	BSMP-7481	C	Functional Organisation of Animals- I Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-7482	C	Biochemistry	3-0-0	3-0-0	75	60	-	15	3
	BSMP-7482	C	Biochemistry Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-7483	C	Developmental Biology	3-0-0	3-0-0	75	60	-	15	3
	BSMP-7483	C	Developmental Biology Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-7484	C	Genetics	3-0-0	3-0-0	75	60	-	15	3
	BSMP-7484	C	Genetics Lab	0-0-1	0-0-2	25	-	20	5	2
Minor Course										
Zoology	BSML-7485	C	Ecology	3-0-0	3-0-0	75	60	-	15	3
	BSMP-7485	C	Ecology Lab	0-0-1	0-0-2	25	-	20	5	2
Summer Internship										
Zoology	BSMI-7486	C	Seminar/ Internship/	0-0-2	0-0-4	50	-	40	10	3

			Community Outreach/ Field Study							
Bachelor of Science (Medical) Semester -VIII										
Zoology	BSML-8481	C	Functional Organisation of Animals- II	3-0-0	3-0-0	75	60	-	15	3
	BSMP-8481	C	Functional Organisation of Animals- II Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-8482	C	Economic Entomology	3-0-0	3-0-0	75	60	-	15	3
	BSMP-8482	C	Economic Entomology Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-8483	C	Applied Zoology (Non Chordates)	3-0-0	3-0-0	75	60	-	15	3
	BSMP-8483	C	Applied Zoology (Non Chordates) Lab	0-0-1	0-0-2	25	-	20	5	2
	BSML-8484	C	Evolution	3-0-0	3-0-0	75	60	-	15	3
	BSMP-8484	C	Evolution Lab	0-0-1	0-0-2	25	-	20	5	2
Minor Course										
Zoology	BSML-8485	C	Medical Zoology	3-0-0	3-0-0	75	60	-	15	3
	BSMP-8485	C	Medical Zoology Lab	0-0-1	0-0-2	25	-	20	5	2

***Note : Students Opting for Zoology subject in Bachelor of Arts/Bachelor of Science/Honours may choose any one of the following Skill Enhancement Course (SEC) in his/her degree Programme during Ist, IInd and IIIrd Year.**

SEC 1: Aquaculture + Lab (Theory & Practical)

SEC 2: Apiculture + Lab (Theory & Practical)

SEC 3: Medical Lab Technology (Theory & Practical)

Bachelor of Science (Medical) Semester–I (Session 2024-25)

ZOOLOGY
DIVERSITY OF NONCHORDATES- I
(PROTOZOA - ANNELIDA)
Course Code: BSML-1483
(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 2024-25)
ZOOLOGY
DIVERSITY OF NONCHORDATES- I
(PROTOZOA - ANNELIDA)
Course Code: BSML-1483
(THEORY)

Credits: 4-0-0 **Max Marks: 100**
Time: 3 Hours **Theory: 80**
CA: 20

Instructions for the Paper Setter

Eight questions of equal marks (16 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.

Introduction to parasitic protozoans

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: *Pheretima posthuma* (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 (3rd ed). Oxford University Press, New York.
6. Pechenik, A. Jan. (2000), Biology of the invertebrates, (4th ed), McGraw Hill Book Co. Singapore.

Bachelor of Science (Medical) Semester–I (Session 2024-25)
ZOOLOGY
NONCHORDATES- I LAB
Course Code: BSMP-1483
(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 2024-25)
ZOOLOGY
NONCHORDATES – I LAB
Course Code: BSMP-1483
(PRACTICAL)

Credits: 0-0-2 **Max Marks: 50**
Time: 3 Hours **Practical: 40**
CA: 10

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

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. Report 6
6. Viva-voce & Practical file. 8

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.

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

Bachelor of Science (Medical) Semester–II (Session 2024-25)
ZOOLOGY
DIVERSITY OF NONCHORDATES- II
(ARTHROPODA - HEMICHAORDATA)
Course Code: BSML-2483
(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 2024-25)
ZOOLOGY
DIVERSITY OF NONCHORDATES- II
(ARTHROPODA - HEMICHAORDATA)
Course Code: BSML-2483
(THEORY)

Credits: 4-0-0 **Max Marks: 100**
Time: 3 Hours **Theory: 80**
CA: 20

Instructions for the Paper Setter

Eight questions of equal marks (16 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:

1. Barnes, R.D. (1999), Invertebrate Zoology. W.B. Saunder, Philadelphia.
2. Dhami, P.S. & Dhami, J. K., Invertebrates, R. Chand & Co., New Delhi, 2001.
3. Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.
4. Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2nd ed), Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
5. Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed), Macmillan, New York.
6. Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.

7. Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3rd ed), Oxford University Press, New York.
8. Pechenik, A. Jan. (2000), Biology of the invertebrates, (4th ed), McGraw Hill Book Co. Singapore.

Bachelor of Science (Medical) Semester–II (Session 2024-25)
ZOOLOGY
NONCHORDATES- II LAB
Course Code: BSMP-2483
(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 2024-25)
ZOOLOGY
NONCHORDATES- II LAB
Course Code: BSMP-2483
(PRACTICAL)

Credits: 0-0-2 **Max Marks: 50**
Time: 3 Hours **Practical: 40**
CA: 10

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. **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.	Assignment	**6**
6.	Viva-voce & Practical file.	**10**

Bachelor of Science (Medical) Semester–II (Session 2024-25)

ZOOLOGY

AQUACULTURE

Course Code: BSMM-2480

(THEORY)

Course outcomes:

After completion of course students will be able to:

CO1: Identify commercially important fishes and exotic fishes.

CO2: Develop basic technical skills necessary for work in different cultures, integrated aquaculture systems and other cultural practices

CO3: Understand artificial breeding technique, induced spawning, brood stock maintenance, larval rearing and grow out systems.

CO4: Apply the knowledge of diseases in-fish culture and marketing of fish.

Bachelor of Science (Medical) Semester–II (Session 2024-25)
ZOOLOGY
AQUACULTURE
Course Code: BSMM- 2480
(THEORY)

Credits: 2-0-0 **Theory: 40**
Time: 3 Hours

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

Morphology of fish (carp, cat-fish, freshwater eel, perch).

Exotic fishes: Introduction, important species, their role in fish culture, impact on fish fauna

UNIT- II

Culture Systems: Conventional, Extensive, Intensive, Monoculture and Polyculture, cage culture. Integrated fish farming (with Duckry, poultry, piggery, dairy and paddy).

Sewage fed fishery.

UNIT- III

Pond culture: Construction of pond, Types of pond, Management of pond (Pre-stocking, stocking and post stocking).

Induced Breeding of fish (Methodology and impact on fish culture).

UNIT- IV

Important Diseases (Viral, Bacterial, Fungal, Helminthes, Crustacean) and their control.

Fish products and by-products.

Marketing of Fish and Preservation of fish.

Suggested Readings:

1. Aggarwal S.C. & Johal M.S., Fishery Development, Narendra Publishing House, Delhi.
2. Jayaram, K.C. (1981), the freshwater fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka- A Hand Book of Zoological Survey of India, Kolkatta.
3. Jhingran V.G. (1991), Fish and Fisheries of India, Hindustan Publishing Corporation of India, Delhi.

4. Johal M.S. & Tandon K.K. (1979,1980), Monograph on the Fishes of reorganized Punjab, (Vol. I & II), Punjab.
5. Johal M.S. & Tandon K.K. (1981), Fisheries of Punjab, Res. Bull, Panjab University, Vol. 32, pp. 143-154.
6. Legler Karl F (1962), Freshwater Fishery Biology, Wm. C-Brown Co. Dublingus IOWA, USA.
7. Munshi, J.S.D and Datta, H.M. (1996), Fish Morphology- Horizons of New Research, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Rath R.K. (1993), Freshwater Aquaculture, Scientific Publishers, Jodhpur.
9. Tandon K.K. and Johal M.S. (1996), Age and Growth of freshwater fishes in India, Narendra Publishing House, New Delhi.

Bachelor of Science (Medical) Semester–II (Session 2024-25)

ZOOLOGY

AQUACULTURE LAB

Course Code: BSMM-2480 (P)

(THEORY)

Course outcomes:

After completion of course students will be able to:

CO1: Know the suitable cultivable fish species in reservoir.

CO2: Understand different types of inland resources and methods to manage these utilized water bodies.

CO3: Impart basic understanding of the nutritional requirements of fish/shellfish larvae and knowledge on mass culture and enrichment of live food organisms.

CO4: Learn about basics of the aquaculture in field

Bachelor of Science (Medical) Semester–II (Session 2024-25)
ZOOLOGY
AQUACULTURE LAB
Course Code: SECP-2483
(THEORY)

Credits: 0-0-1 **Practical: 20**
Time: 3 Hours

1. Morphology of a Carp, Cat fish and Perch.
2. Identification of the following fishes using key: *Notopterus spp.; Labeo rohitta, L. bata, Cirrhinus mrigala, Catla catla, Puntius sarana, Tor putitora, Schizothorex, Aorichthys seenghala, Wallago attu, Callichrous padda, Bagarius bagarius, Heterpneustus fossilis, Channa marulius, C. Striatus, Xenetondon cancila, Cyprinus carpio,Hypophthalamichthys molitrix, Ctenopharyngodon idella, Colisa fasciatu and Mastacembelus armatus*.
   For the identification of these fishes, the candidate can use already prepared keys or they can prepare their own keys.
3. Determination of feeding habits of the fish from the position of mouth.
4. To observe the seasonal changes in the gonads during different phases of the reproductive cycle.
5. Identification of aquatic weeds of a fish pond.
6. Estimation of following physico-chemical parameters of pond water:
   1. Temperature
   2. pH
   3. Dissolved oxygen
   4. Phosphates
   5. Total Dissolved solids
   6. Nitrates
   7. Hardness
   8. Examination of diseased fishes
7. Visit of fish farm and preparation of report.

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

ANNEXURE C

FACULTY OF LIFE SCIENCES

Syllabus for

Bachelor of Science (Medical)

(SEMESTER: III-IV)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2024-25

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

KANYA MAHA VIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Session-2024-25

Bachelor of Science (Medical) Semester -III										
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-3483 (I)	**C**	**50**	**Evolution**	**2-0-0**	**40**	**-**	**10**	**3**
		BSMM- 3483 (II)		**75**	**Biodiversity-III**	**3-0-0**	**60**	**-**	**15**	**3**
		BSMM- 3483 (P)		**50**	**Practical -III (Related to Evolution and Biodiversity-III)**	**0-0-2**	**-**	**40**	**10**	**3**
Bachelor of Science (Medical) Semester -IV										
Zoology	Bachelor of Science (Medical)	BSMM-4483 (I)	**C**	**50**	**Biochemistry**	**2-0-0**	**40**	**-**	**10**	**3**
		BSMM- 4483 (II)		**75**	**Animal Physiology**	**3-0-0**	**60**	**-**	**15**	**3**
		BSMM- 4483 (P)		**50**	**Practical -IV (Related to Biochemistry and Animal Physiology)**	**0-0-2**	**-**	**40**	**10**	**3**

B.Sc. (Medical) (Semester–III) (Session 2024-25)

ZOOLOGY

EVOLUTION

Course Code: BSMM-3483 (I)

(THEORY)

Course Outcome

After passing this course the student will be able to:

- CO1. Understand concept of evolution and identify the contributions of various Evolutionists.
- CO2. Know about origin of life and concept of speciation.
- CO3. Gain knowledge about fossils and its significance as well as evolution of man.
- CO4. Understand ecological adaptations in fishes, reptiles, birds and mammals.

B.Sc. (Medical) (Semester–III) (Session 2024-25)

ZOOLOGY

EVOLUTION

Course Code: BSMM-3483 (I)

(THEORY)

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

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Introduction to evolution
Evidences of organic evolution

Theories of organic evolution

Unit II

Origin of life
Concept of micro, macro and mega-evolution
Concept of Species
Speciation

Unit III

Fossils, its types and significance
Evolutionary rate
Origin & Extinction of reptiles
Evolution of man (in Brief)

Unit IV

Migration & Parental Care in Pisces
Flight adaptation & Bird migration
Adaptive radiations like scales & fins in fish, poison apparatus in snakes and dentition in Mammals.

Suggested Readings:

1. Avers, C. J.(1989). Evolution Process and Pattern in Evolution, New York Oxford Oxford university press.
2. Bhamarah, H.S.(1993), Juneka K., Cytogenetics & Evolution, Anmol Publication Pvt. Ltd.
3. Brookfield, A. P. (1986). Modern aspects of Evolution. Nelson Thornes publishers
4. Colbert. E.H.(2002), Evolution of Vertebrates, cbspd publishers

5. Freeman, S. and Herron, Jon C. (2007). Evolutionary analysis, Pearson Prentice Hall, New Jersey.
6. Futuyma, D. J. (1998), Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
7. Meglitsch, P. A. (1991), Invertebrate Zoology (3rded), Oxford University Press.
8. Wen-Hsiung Li (1997), Molecular Evolution, Sinauer associatesInc.Pub. USA.
9. Rastogi, V.B(2003) Organic evolution, Medtech publishers
10. Strickberger, M.N(2000) Evolution , Jones and Bartlett publishers.
11. Tomar, B.S. and S.P.Singh(2000)Evolutionary Biology, Rastogi publishers.

B.Sc. (Medical) (Semester–III) (Session 2024-25)

ZOOLOGY

Biodiversity-III (Chordates)

Course Code: BSMM-3483 (II)

(THEORY)

Course Outcomes

After passing this course the student will be able to:

- CO1. Understand general body plan of Herdmania and external characters of Amphioxus.
- CO2. Understand external characters and affinities of Petromyzon as well as body systems of Labeo.
- CO3. Understand body plan and various systems of Frog and Uromastix.
- CO4. Understand body systems of Pigeon and Rat.

B.Sc. (Medical) (Semester–III) (Session 2024-25)

ZOOLOGY

BIODIVERSITY-III (Chordates)

Course Code: BSMM-3483 (II)

(THEORY)

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

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Brief Introduction to Protochordata

Urochordata: Type study- *Herdmania*
Cephalochordata: External features and affinities of *Amphioxus*

Unit II

Cyclostomata: External Characters of *Petromyzon*

Affinities of Cyclostomata

Pisces: Type study-*Labeo*

Unit III

Amphibia: Type study-Frog

Reptilia: Type study-*Uromastix*

Unit IV

Aves: Type study-Pigeon
Mammals: Type study-Rat

Suggested Reading Material.

1. Dhami, P.S. &Dhami J.K. (1998), Vertebrates, R. Chand & Co., New Delhi.
2. Hildebrand, M. and Goslow. Jr. G.E. (2001), Analysis of Vertebrates Structure, John Wiley, N. Y.
3. Jollie, M. (1968), Chordate Morphology, Reinhold, New York.
4. Kardong, K. V. (1995), Vertebrates – Comparative Anatomy, Function, Evolution. W.B.C. Pub. , Oxford.

5. Kent, G. C. and Carr, R. K. (2001), Comparative Anatomy of the Vertebrates (9th ed), McGraw Hill Higher Education, New York.
6. Linzey, D. (2001), Vertebrate Biology, McGraw Hill Publishing Company, New York.
7. Pough, F. H., Heiser, J. B. and McFarland, W. N. (1990), Vertebrate Life (3rd ed), Macmillan Pub. Co., New York.
8. Young, J. Z. (1982), The Life of Vertebrates, New York.
9. Parker, T.J. and Haswell, W.A (1981) Text Book of Zoology, Vol. II (Vertebrates), ELBS and Macmillian Press Ltd.

B.Sc. (Medical) (Semester–III) (Session 2024-25)

ZOOLOGY

Practical-III (Related to Evolution and Biodiversity-III)

Course code: BSMM-3483(P)

Course Outcomes

- CO1. Familiarize organ systems.
- CO2. Know about economically important specimens (preserved).
- CO3. Understanding of evolutionary phenomena.
- CO4: Learn about histology and morphology of chordates

B.Sc. (Medical) (Semester–III) (Session 2024-25)

Practical-III (Related to Evolution and Biodiversity-III)
Course code: BSMM-3483(P)

LTP: 0-0-2 **Marks: 40**
Time: 3 Hrs. **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

Guidelines for conduct of Practical Examination:

1.	Draw a labelled sketch of the system of the given animal & explain it to the Examiner.	5
2.	Identify and classify the specimens upto order level. Write a short note on habitat, special features, feeding, habits and economic importance of the specimens.	10
3.	Idendify and write a note on the evolutionary phenomenon in the given specimen.	5
4.	Identify the slides/specimens, give two reasons for identification.	8
5.	Assignment/ Visit Report	6
6.	Viva-voce & Practical file.	6

I. Classification up to order level, except in case of Pisces and Aves where classification up to subclass level, habits, habitat, external characters and economic importance (if any) of the following animals is required :

Urochordata **:** *Herdmania, Molgula, Pyrosoma, Doliolum, Salpa&Oikopleura.*

Cephalochordata: *Amphioxus.* Study of the following prepared slides:
T.S. *Amphioxus* through various regions, Pharynx of *Amphioxus*

Cyclostomata : *Myxine, Petromyzon &Ammocoetes*Larva.

Chondrichthyes : *Zygaena*(hammer head shark), *Pristis* (saw fish), *Narcine (electric ray), Trygon, Rhinobatus and Chimaera* (rabbit fish).

Actinoptergii :*Polypterus, Acipenser, Lepidosteus, Muraena, Mystus, Catla, Hippocampus, Syngnathus, Exocoetus, Anabas, Diodon, Tetradon, Echeneis and Solea.*

Dipneusti (**Dipnoi**) : *Protopterus*(African lung fish)

Amphibia : *Uraeotyphlus, Necturus, Amphiuma, Amblystoma*and its Axolotl Larva, *Triton, Salamandra, Hyla, Rhacophorus*

Reptilia : *Hemidactylus, Calotes, Draco, Varanus, Phrynosoma, Chamaeleon, Typhlops, Python, Eryx, Ptyas, Bungarus, Naja, Hydrus, Vipera, Crocodilus, Gavialis,*

Chelone(turtle) and *Testudo* (tortoise),Differences in nonpoisonous and poisonous snakes.

Aves : *Casuarius, Ardea, Anas, Milvus, Pavo, Eudynamics, Tyto* and *Alcedo.*

Mammalia : *Ornithorynchus, Echidna, Didelphis, Macropus, Loris, Macaca, Manis, Hystrix, Funambulus, Panthera, Canis, Herpestes, Capra, Pteropus.*

II. Study of the following systems with the help of charts/models/videos:

Herdmania **:** General anatomy

Labeo : Digestive and reproductive systems, heart, afferent and branchial arteries, cranial nerves and internal ear.

Pigeon : Digestive, arterial, venous and urino-genital systems.

WhiteRat : Digestive, arterial, venous and urino-genital systems.

Study of permanent slides of whole mount of Pharynx of *Herdmania*and *Amphioxus.*

Cycloid scales of *Labeo,* blood smear of mammal, Histology of rat/rabbit (compound tissues)

Demonstration of evolutionary phenomena like homology, analogy, mimicry, crypsis.

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

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

BIOCHEMISTRY

Course Code: BSMM-4483 (I)

(THEORY)

Course Outcome

After passing this course the student will be able to:

- CO-1. Understand the structure and functions of biologically important molecules.
- CO-2. Understand about enzymes, coenzymes and lipid metabolism.
- CO-3. Understand various processes of carbohydrate metabolism.
- CO-4. Gain knowledge about protein metabolism.

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

BIOCHEMISTRY

Course Code: BSMM-4483 (I)

(THEORY)

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

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Biochemistry and its scope
Classification and functions of:
- Carbohydrates
- Proteins
- Lipids
- Nucleic acids

Unit II

Enzymes:
- Nature and their classification
- Coenzymes.

Lipid Metabolism:
- B-Oxidation of fatty acid
- Ketosis

Unit III

Carbohydrate Metabolism:
- Glycolysis
- Tricarboxylic acid cycle
- Hexose monophosphate shunt
- Glycogenesis
- Glycogenolysis
- Gluconeogenesis
- Oxidative Phosphorylation

Unit IV

Protein Metabolism:

Metabolism of amino acids
Oxidative deamination
Transamination
Decarboxylation
Hydrolysis of proteins
Ornithine cycle

Suggested Reading Material:-

1. Conn, E.E., Stump. P.K. Bruening, S. and Doi R.H. (2006), Outlines of Biochemistry (5th ed), John Wiley and Sons Inc., New York.
2. Fischer, J. and Arriold, J.R.P. (2001). Instant notes in Chemistry for Biologists, Viva Books Pvt. Ltd.
3. Harper, H.A. (2018): Harper's Biochemistry (31st ed).
4. Holde, K.E.V., Johnson, W.C. and Shing, P. (2005). Principles of Physical Biochemistry Prentice Hall, Inc., USA.
5. Lehninger, A (2017). Principles of Biochemistry, (7th ed).
6. Morris, H. Best, L.R., Pattison, S., Arerna, S. (2013). Introduction to General Organic Biochemistry, (11th ed), Wadsworth Group.
7. Robert, K., Murray, Mayes Daryl, K. Granner, Victor, W., Woodwell (1990), Harper's Biochemistry, 22nd Edition, Prentice Hall International Inc.
8. Sheehan, D (2013). Physical Biochemistry: Principles and Applications – John Wiley & Sons Ltd., England.
9. Stryer, L. (2019). Biochemistry (9th ed), San Francisco W.H. Freeman.

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

Animal Physiology

Course Code: BSMM-4483 (II)

(THEORY)

Course Outcomes

After passing this course the student will be able to:

- CO1. Understand mechanism of digestion and respiration.
- CO2. Have knowledge about composition of blood, blood groups, cardiac cycle and urine formation.
- CO3. Understand mechanism of skeletal muscle contraction and neural integration.
- CO4. Understand physiology of behavior and endocrine system.

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

Animal Physiology

Course Code: BSMM-4483 (II)

(THEORY)

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

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Digestion : Digestion of dietary constituents, regulation of digestive processes and absorption. Extra and intra cellular digestion, enzymatic digestion and symbiotic digestion.

Respiration : Transport of O_2 and CO_2, Oxygen dissociation curve of haemoglobin, Bohr effect, chloride (-) shift, Haldane effect and control of breathing.

Unit II

Heart : Origin and regulation of heart beat, cardiac cycle, electrocardiogram, cardiac output, Blood pressure and micro-circulation.

Blood : Composition and functions of blood and lymph. Blood clotting. Blood groups including Rh factor, haemopoiesis

Excretion : Urine formation and osmoregulation.

Unit III

Muscles : Ultrastructure, chemical and physical basis of skeletal muscle contraction.

Neural Integration: Structure of neuron, resting membrane potential, Origin and propagation of impulse along the axon, synapse and myoneural function.

Unit IV

Physiology of Behavior: Taxes and reflexes, instinctive and motivate learning and reasoning

Endocrine : Structure and physiology of thyroid, parathyroid, adrenal, hypothalamus, pituitary, pancreas and gonads.

Suggested Reading Material:

1. Guyton, and Hall, (2015), Text Book of Medical Physiology, 15th Edition, Elsevier.

2. Hill, R. W., Wyse, G. K. and Anderson, N. 3 edi (2012), Animal physiology, Sinauer Associate, INC. Pub. Saunderland, Massachusettes, USA.
3. Hoar, W. S. (1984), General and Comparative Physiology, Prentice Hall of India Pvt. Limited, New Delhi, India.
4. Prosser, C.L.4th Edi (1991), Comparative Animal Physiology, Satish Book Enterprise Books seller & Publishers, Agra.
5. Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life – The Science of Biology (6th ed), Sinauer Assoc. Inc., USA.
6. Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology: Mechanisms and Adaptations, W.H. Freeman and Company, New York.
7. Taneja, S.K.(1997), Biochemistry & Animal Physiology, Trueman Book Co.
8. Willmer, P. Stone, G. and Johnston, I (2000). Environmental Physiology of Animals, Blackwell Science.
9. Withers, P.C. (1992), Comparative Animal Physiology, Saunder College Publishing, New York.

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

Practical -IV (Related to Biochemistry and Animal Physiology)

Course Code: BSMM-4483 (P)

(PRACTICAL)

Course Outcomes

- CO-1. Learn clinical procedures for blood & urine analysis.
- CO-2. Develop skill in simple biochemical laboratory procedures.
- CO-3. Skill in observing and to some extent in analysing various Biological Data.
- CO-4. Know about adulteration in food

B.Sc. Medical (Semester–IV) (Session 2024-25)

ZOOLOGY

Practical -IV (Related to Biochemistry and Animal Physiology)

Course Code: BSMM-4483 (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. Study of the skeleton of *Scoliodon, Rana, Varanus, Gallus* and *Oryctolagus*.
2. Identification of food stuffs: starch, glucose, proteins and fats in solution.
3. Demonstration of osmosis and diffusion.
4. Demonstrate the presence of amylase in saliva, denaturation by pH and temperature.
5. Determination of coagulation and bleeding time of blood in man/rat/rabbit.
6. Determination of blood groups of human blood sample.
7. Recording of blood pressure of man.
8. Analysis of urine for urea, chloride, glucose and uric acid.
9. Estimation of haemoglobin content.
10. Field study: Visit to a fossil Park/Lab/ Science City and submit a report / Familiarity with the local vertebrate fauna.

Guidelines for conduct of Practical Examination:

1.	Identify the given bones, make labeled sketches of their respective–views	8
2.	Write down the steps and determine the constituents in the given sample.	3
3.	Write the procedure and perform the given physiology experiment.	3
4.	Report on visit to a fossil park/lab/Science City/study of local vertebrate fauna.	2
5.	Viva-voce & Practical file.	4

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

ANNEXURE D

KANYA MAHA VIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Session-2024-25

Course Name	Program Name	Course Code		Course Type	Marks					Examination time (in Hours)
					Total	Paper	Ext.		CA	
							L	P		
SEMESTER V										
Zoology	B.Sc. (Medical)	BSMM-5483	I	E	100	Developmental Biology	30	-	20	3
			II			Genetics	30	-		3
			P			PRACTICAL-V (Related to Developmental Biology & Genetics)	-	20		3
SEMESTER VI										
Zoology	B.Sc. (Medical)	BSMM-6483	I	E	100	Medical Zoology	30	-	20	3
			II			Medical Laboratory Technology	30	-		3
			P			PRACTICAL-VI (Related to Medical Zoology & Medical Laboratory Technology)	-	20		3

B.Sc. Medical (Semester–V) (Session 2024-25)

ZOOLOGY

Course Title: Developmental Biology

Course Code: BSMM-5483 (I)

(THEORY)

Course Outcome

After successfully completing this course, students will be able to:

CO1: Understand the key events in early embryological development like gametogenesis, fertilization and parthenogenesis.

CO2: Explain the process of cleavage, gastrulation, determination and differentiation.

CO3: Elaborate the development of frog, its metamorphosis and chick up to three germ layers.

CO4: Describe the development of rabbit, formation of foetal membranes and placenta.

B.Sc. Medical (Semester–V) (Session 2024-25)
ZOOLOGY
Course Title: Developmental Biology
Course Code: BSMM-5483 (I)
(THEORY)

Examination Time: 3 Hrs. **Max Marks: 30**

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Gametogenesis with particular reference to differentiation of spermatozoa, vitellogenesis; role of follicle/subtesticular cells in gametogenesis
Egg maturation; egg membranes; polarity of egg
Parthenogenesis
Fertilization

UNIT-II

Cleavage and its patterns
Gastrulation
Determination and differentiation
Tissue interactions, basic concepts of organizers and inductors and their role
Embryonic development of Herdmania

UNIT-III

Development up to three germinal layers and their fate in frog and chick
Fate maps of chick and frog embryos
Metamorphosis in Frog

UNIT-IV

Embryonic development of Rabbit
Foetal membranes, their formation and role
Mammalian placenta–its formation, types and functions

Suggested Readings:

1. Balinsky, B.I. (2007), An Introduction to Embryology, Saunders, Philadelphia.
2. Bellairs, R. (1971), Development Processes in Higher Vertebrates, University of MiamiPress, Miami.
3. Berrill. N.J. (1971), Developmental Biology. McGraw Hill, New Delhi.
4. Gilbert, F. (2017), Developmental Biology, Sinaur.

5. Goel, S.C. (1984), Principles and Animal Developmental Biology, Himalaya, Bombay.
6. Karp. G. &Berrill, M.J. (1981), Development. McGraw Hill, New Delhi.
7. Pritchard, D.J. (1986), Foundation of Development Genetics, Taylor and Francis, London.
8. Saunders, J.W. (1982), Developmental Biology, Patterns, Principles, Problems, MacMillan,New York.
9. Waddigton CH. (1966), Principles of Development and Differentiation, MacMillan, NewYork.
10. Miller, W.A. (1997), Developmental Biology Springer Verlag, New York.

B.Sc. Medical (Semester–V) (Session 2024-25)
ZOOLOGY
Course Title: Genetics
Course Code: BSMM-5483 (II)
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms. Understanding the role of genetic mechanisms like linkage, crossing over and multiple alleles.

CO2. Understand structure of nucleic acid, process of replication and translation, genetic code.

CO3: Understanding of how genetic concepts of mutations, regulation of gene expression and extranuclear inheritance.

CO4: Evolutionary and quantitative genetics including: the basis of genetic variation; heritability; Hardy-Weinberg Equilibrium and key concepts in population and how it affects broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.

B.Sc. Medical (Semester–V) (Session 2024-25)
ZOOLOGY
Course Title: Genetics
Course Code: BSMM-5483 (II)
(THEORY)

Examination Time: 3 Hrs. **Max Marks: 30**

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Modification of Mendelian Ratios: Non-allelic gene interaction, Modified F2 ratios. (9:7; 9:3:4; 12:3:1; 13:3; 15:1; 9:6:1), Gene modifications due to incomplete dominance; lethal Factors (2:1); Pleiotropic genes.

Multiple Alleles: Blood group inheritance, eye colour in *Drosophila*, pseudoallelism.

Multiple Factors: Qualitative and quantitative characters, inheritance of quantitative traits (skin colour in man).

Linkage: Linkage, sex-linked characters

Crossing Over and Recombination: crossing over, frequency of crossing over, cytological basis of crossing over, synaptonemal complex. Recombination in Fungi (Tetrad analysis).

UNIT-II

Gene and Genetic Code: Structure of nucleic acids **(DNA & RNA).**

Replication & transcription of DNA

Expression of gene (Protein synthesis in Prokaryotes and Eukaryotes).

Genetic code: Properties of genetic code, codon assignment, wobble hypothesis, split and overlapping Genes.

UNIT-III

Mutations: Spontaneous and induced mutations, physical and chemical mutagen. Detection of mutations in Maize and *Drosophila.* Inborn errors of metabolism in man (Phenylketonuria, Alcaptonuria, Albinism). Somatic mutations and carcinogenesis.

Regulation of gene expressions in prokaryotes (Operon model) in eukaryotes.

Extranuclear inheritance: Chloroplast with special reference to *Mirabilis jalapa*and kappa particles in *Paramecium.*

UNIT-IV

Population genetics: Equilibrium of gene frequencies and Hardy-Weinberg law.

Genetic recombination in bacteria (conjugation, transduction and transformation) and in plasmids.

Applied Genetics: Recombination DNA, Genetic cloning and its applications in medicine and agriculture, DNA finger printing.

Suggested Readings:

1. Klug ,Cummings, Spencer, Palladino, Killian(twelth edition),Concepts of Genetics
2. Gardener, E.J., Simmons, M.J. &Sunstad, Principles of Genetics, (8th ed), D.P. John Wiley & Sons, New York.
3. Benjamin A. Pierce ,Genetics: a conceptual approach(6^{th} edition)
4. P.S Verma and V.K Aggarwal ,Genetics(9^{th} edition) S.Chand publications.
5. Veer BalaRastogi, Genetics (4^{th} edition) ,Knrn publications.
6. Prof P. K. Gupta(5^{th} revised edition 2018-19), ,Genetics Rastogi publications.
7. C. B Powar (2018) ,Cell Biology Himalayan publishing house.
8. Miglani, G.S(2000),Basic Genetics ,Narosa publishing house, New Delhi.
9. Weaver, R.F. and Hedrick, P.W. (1992), Genetics, Wm. C. Brown Publishers Dubuque.

B.Sc. Medical (Semester–V) (Session 2024-25)

ZOOLOGY

Course Title: PRACTICAL–V (Related to Developmental Biology and Genetics)

Course Code: BSMM-5483 (P)

Course Outcomes

CO1: Learn the process of gametogenesis and development patterns of frog, chick and Larva of Herdmania.

CO2: Understand pedigree analysis and preparation of family charts.

CO3: Learn about the inheritance of morphogenetic human characters and dermatoglyphics.

CO4: Understand numericals based on mendelian ratios and Hardy Weinberg law.

B.Sc. Medical (Semester–V) (Session 2024-25)

ZOOLOGY

Course Title: PRACTICAL–V (Related to Developmental Biology and Genetics)

Course Code: BSMM-5483 (P)

Examination Time: 3 Hrs. **Marks: 20**

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.

Guidelines for Conduct of Practical Examination:-

1.	Two Numericals based on Mendel/Hardy Weinberg Law.	6
2.	Perform the experiment for Dermatoglyphics/ Random mating/ Pod Length.	**3**
3.	Identification of given spots/slides.	**3**
4.	Make a pedigree chart from the given data.	**2**
5.	Chart/Assignment.	**2**
6.	Viva-voce and practical file.	**4**

1. Demonstrate the Law of segregation and independent assortment (use of coloured beads capsulesetc.).
2. Numericals for Segregation, Independent assortment,Epistasis&Hardy-Weinberg Law.
3. Demonstration of segregation in preserved material (Maize).
4. Demonstration of cytoplasmic inheritance in snails.
5. Inheritance of human characteristics.
6. Comparison of variance in respect of pod length and number of seeds/pods.
7. Calculation of gene frequencies and random mating (Coloured beads, capsules).
8. Pedigree analysis
9. Dermatoglyphics: Palm print and Finger tip patterns.
10. Study of the following permanent slides :
    - Polytene Chromosomes of *Chironomus.*
    - Stages of gametogenesis, structure of egg and sperm of a mammal.
    - Larva of *Herdmania.*
    - Developmental stages of frog-upto tadpole, chick-upto 96 hr.
11. Preparationof slide for Barr body from cheek cells.
12. **Assignment**: Preparation of charts showing developmental stages of any vertebrate.

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

B.Sc. Medical (Semester–VI) (Session 2024-25)

ZOOLOGY

MEDICAL ZOOLOGY

Course Code: BSMM-6483 (I)
(THEORY)

Course Outcome

After successfully completing this course, students will be able to:

CO-1. Understand about various pathogenic microbes, life history of various pathogenic protozoans and helminths as well as diseases caused by them.

CO-2. Know about life history, diseases and control measures of arthropod vectors and awareness about epidemic diseases.

CO-3. Provide basics knowledge about immune responses, antigens, antibody structure and immunoglobulins.

CO-4. Understand antigen-antibody interactions and gain knowledge about vaccines.

B.Sc. Medical (Semester–VI) (Session 2024-25)
ZOOLOGY

MEDICAL ZOOLOGY

Course Code: BSMM-6483 (I)
(THEORY)

Max. Time: 3 Hrs. **Max Marks: 30**

Instructions for the Paper Setter

Eight questions of equal marks (6 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

1. Introduction of Parasitology (various terminologies in use).
2. Brief introduction to pathogenic microbes, viruses, Rickettsiae, spirochaetes and bacteria.
3. Brief accounts of life history, mode of infection and pathogenicity of the following with reference to man; prophylaxis and treatment:

a) Pathogenic protozoa: *Entamoeba, Trypanosoma, Leishmania, Giardia, Trichomonas* and *Plasmodium.*

b) Pathogenic helminthes: *Fasciola, Schistosoma, Echinococcus, Ancylostoma, Trichinella, Wuchereria, Dracunculus* and *Oxyuris.*

UNIT-II

4. Life cycle and control measures of arthropod vectors of human disease: Malaria *(Anopheles stephens, A.culicifaces,* Yellow fever, Dengue, Dengue haemorrhagic fever and Chickengunea. *(Aedes aegypti A. Albopicuts)*; Filariasis *(Culex pipien satigeans) Mansonia* sp. Japanese Encephalitis *(C. trinanelorhynchus);* Plague *(Stenophalide cheopis)* and Epidemic Typhus *(Pediculus spp).*
5. Epidemic diseases, such as Typhoid, Cholera, Small pox; their occurrence and eradication programs.

UNIT-III

6. Brief introduction to human defence mechanisms.
7. Humoral and cell mediated immune response. Physical & chemical properties of antigens. Antibody structure and function of M, G, A, E and D immunoglobulins.

UNIT-IV

8. Antigen and antibody interactions-Serodiagnostic assays (Precipitation, agglutination immunodiffusion, ELISA,RIA)
9. Vaccines

Suggested Readings:

1. Baker,F.J.andSilverton,R.E.(1985)IntroductiontoMedicalLaboratoryTechnology,(6th ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D. (2019), Parasitology, Protozoology and Helminthology (13thed).
3. Cheesborough, M. (1991), Medical Laboratory Technology for Tropical countries, Butlerworth and Co.,Ltd.
4. Garcia, L.S. (2001), Diagnostic Medical Parasitology, (4th ed), ASM Press Washington.
5. Kimball,J.W.(1987),Introduction of Immunology, (2nd ed),MacMillian Publishing Co.,NewYork.
6. Kuby, J. (2013), Immunology, 7th Edition W.H. Freeman & Co.,USA.
7. Roitt, I. (2017), Essential Immunology, 13th Edition, Blackwell Scientific Publications, Oxford.
8. Talib, V.H. (2019), Essential Laboratory Manual,2nd edition, Mehta Publishers, New Delhi.

B.Sc. Medical (Semester–VI) (Session 2024-25)
ZOOLOGY

MEDICAL LABORATORY TECHNOLOGY

Course Code: BSMM-6483 (II)
(THEORY)

Course Outcome

After successfully completing this course, students will be able to:

CO 1: Comply with safety regulations and universal precautions during lab investigations and perform basic laboratory techniques on biological specimens.

CO 2: Know about routine clinical laboratory investigations including collection of different samples and perform other routine hematological procedures.

CO 3: Describe basic scientific principles in learning new techniques and procedures in bacteriology and microbiology.

CO 4: Apply knowledge and technical skills associated histopathology, staining techniques and biochemical estimations.

B.Sc. Medical (Semester–VI) (Session 2024-25)
ZOOLOGY

MEDICAL LABORATORY TECHNOLOGY

Course Code: BSMM-6483 (II)
(THEORY)

Max. Time: 3 Hrs. **Max Marks: 30**

Instructions for the Paper Setter

Eight questions of equal marks (6 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

Laboratory safety rules, hazards and precautions during sample collection and laboratory investigations.

Laboratory Techniques: Colorimetry, Microscopy, Autoclaving, Centrifugation and Spectrophotometry

UNIT-II

Collection, transportation and preservation of different clinical samples.

Haematology: collection of blood (venous and capillary), anticoagulants (merits and demerits), Romanowsky's stains, total RBC count, erythrocyte sedimentation rate, TLC, DLC, platelet count.

UNIT-III

Bacteriology: sterilization (dry heat, moist heat, autoclave, filtration), disinfection, staining techniques,(gram stain, AFB stain,etc),culture media (defined and synthetic media & routine laboratory media), bacterial culture (aerobic and anaerobic) and antibiotic sensitivity.

UNIT-IV

Histopathology: Common fixatives and staining techniques.

Biochemistry: Principal/theory and significance of estimation of urea, sugar, cholesterol, creatinine, enzymes (transaminase, phosphatase, amylase and lipase), uric acid in blood, estimation of proteins, sugar, bile salts, ketone bodies in urine and liver function test.

Suggested Readings:

1. Baker, F.J. and Silverton, R.E. (1985) Introduction to Medical Laboratory Technology,(6th ed), Butlerworth and Co.Ltd.
2. Chatterjee, K.D.(2019), Parasitology, Protozoology and Helminthology (13thed).
3. Cheesborough, M.(1991), Medical Laboratory Technology for Tropical countries,Butlerworth and Co.,Ltd.
4. Garcia, L.S.(2001), Diagnostic Medical Parasitology, (4th ed), ASM PressWashington.
5. Kimball,J.W.(1987),IntroductionofImmunology, (2nd ed),MacMillianPublishingCo.,NewYork.
6. Kuby, J.(2013), Immunology, 7th Edition W.H. Freeman & Co.,USA.
7. Roitt, I. (2017), Essential Immunology, 13th Edition, Blackwell Scientific Publications,Oxford.
8. Talib, V.H.(2019), Essential Laboratory Manual,2nd edition, Mehta Publishers, NewDelhi.

B.Sc. Medical (Semester–VI) (Session 2024-25)

ZOOLOGY

PRACTICAL–VI (Related to Medical Zoology & Medical Laboratory Technology)

Course Code: BSMM-6483 (P)

(PRACTICAL)

Course Outcomes

CO1: Apply knowledge and technical skills associated with medical laboratory technology for delivering quality clinical investigations support.

CO2: Perform basic clinical laboratory procedures using appropriate laboratory techniques and instrumentation in accordance with current laboratory safety protocol and quality patient health care.

CO3: Understanding of sterilization techniques and will also learn about various histopathology techniques, handling and processing of tissue specimens as well as staining procedures.

CO4: Understanding of estimation of protein & sugar

B.Sc. Medical (Semester–VI) (Session 2024-25)

ZOOLOGY

PRACTICAL–VI (Related to Medical Zoology & Medical Laboratory Technology)

Course Code: BSMM-6483 (P)

(PRACTICAL)

Time: 3 hrs. **Max. Marks:20**

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. Demonstration of safety rules in laboratory like proper handling of patients, specimens and disposal of syringes, needles etc.
2. Demonstration of the use of autoclave, centrifuge and spectrophotometer.
3. Cleaning and sterilization of glass ware, using hot air oven, autoclave etc.
4. Physico-chemical examination of urine.
5. Preparation of thick and thin blood smear.
6. Counting of WBC, RBC and DLC.
7. Study of permanent slides and specimens of parasitic protozoans, helminthes and arthropods mentioned in the theory syllabus.
8. ESR and haematocrit.
9. Estimation of blood sugar, protein.
10. Demonstration of fixation, embedding, cutting of tissue sections, and their staining (routine haematoxylin and eosin).
11. Visit to a pathology Lab and preparation of report.

Guidelines for conduct of Practical Examination:

1.	Write down the principle and working of the given equipment.	4
2.	Write down the procedure, precautions and perform the experiment for physico-chemical examination of urine/ haematology.	4
3.	Identification, pathogenicity and host of parasitic organism.	4
4.	Estimation of blood sugar / protein in the given sample.	4
5.	Viva-voce and practical file	4

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

Annexure E

FACULTY OF LIFE SCIENCES

Syllabus for

Bachelor of Science (Honours) Medical Laboratory Technology

(SEMESTER: I-VIII)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2024-28

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF FOUR-YEAR DEGREE PROGRAMME

Session-2024-28

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -I)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-1421 BMLL-1031 BMLL-1431	Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History and Culture	C	4-0-0	4	-	-	100	80	-	20	3
BMLM-1102	Communication Skills in English	AEC	3-0-1	3	-	2	100	50	30	20	3
BMLL-1483	Basics of Human Physiology-I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-1483	Practical in Basics of Human Physiology-I	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-1484	Basics of Human Anatomy -I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-1484	Practical in Basics of Human Anatomy -I	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-1485	Principles of Biochemistry	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-1485	Practical in Principles of Biochemistry	DSC	0-0-2	-	-	4	50	-	40	10	3
VACF-1491	*Foundation Course	VAC	2-0-0	2	-	-	50	40	-	10	1
Total Credits			25	Total marks			625				

1 Special paper in lieu of Punjabi (Compulsory).
2 Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.
***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
C- Compulsory
VAC- Value Added Course
DSC- Discipline Specific Course
AEC- Ability Enhancement Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -II)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-2421 BMLL-2031 BMLL-2431	Punjabi (Compulsory) [1]Basic Punjabi [2]Punjab History and Culture	C	4-0-0	4	-	-	100	80	-	20	3
BMLM-2102	Communication Skills in English	AEC	3-0-1	3	-	2	100	50	30	20	3
BMLL-2483	Hematology-I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-2483	Practical in Hematology-I	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-2484	Basics in Human Physiology-II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-2484	Practical in Basics of Human Physiology-II	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-2485	Basics of Human Anatomy-II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-2485	Practical in Basics of Human Anatomy-II	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLM-2130	Fundamentals of Data Analytics	SEC	2-0-1	2	-	2	75	30	30	15	3
VACD-2161	*Drug Abuse: Problem, Management and Prevention (Compulsory)	VAC	2-0-0	2	-	-	50	40	-	10	3
Total Credits			28	Total marks			700				

1 Special paper in lieu of Punjabi (Compulsory).
2 Special paper in lieu of Punjabi (Compulsory) for those students who are not domicile of Punjab.
***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
C-Compulsory
VAC- Value Added Course
DSC- Discipline Specific Course
AEC- Ability Enhancement Course
SEC- Skill Enhancement Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -III)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-3481	Haematology- II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-3481	Practical in Haematology- II	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL- 3482	Pathology- I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-3482	Practical in Pathology-I	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-3483	Clinical Biochemistry-I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-3483	Practical in Clinical Biochemistry-I	DSC	0-0-2		-	4	50	-	40	10	3
BMLL-3064	Introduction to Bacteriology and Virology	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-3064	Practical in Introduction to Bacteriology and Virology	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-3065	Basics of Microbiology-I	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-3065	Practical in Basics of Microbiology-I	DSC	0-0-1	-	-	2	25	-	20	5	3
VACG-3531	*Gender Sensitization	VAC	1-0-1	1	-	2	50	30	10	10	1
	Total Credits		25	Total marks			625				

***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
DSC- Discipline Specific Course
VAC- Value Added Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -IV)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-4481	Haematology- III	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-4481	Practical in Haematology- III	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-4482	Pathology-II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-4482	Practical in Pathology-II	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-4483	Clinical Biochemistry-II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-4483	Practical in Clinical Biochemistry-II	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-4064	Basics of Microbiology-II	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-4064	Practical in Basics of Microbiology-II	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-4485	Immunology-I	MDC-I	3-0-0	3	-	-	75	60	-	15	3
BMLP-4485	Practical in Immunology-I	MDC-I	0-0-1	-	-	2	25	-	20	5	3
VACE- 4221	*Environmental Studies (Compulsory)	VAC	1-0-1	1	-	2	50	30	10	10	3
Total Credits			25	Total marks			625				

***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
DSC- Discipline Specific Course
VAC- Value Added Course
MDC- Multi Disciplinary Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -V)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-5481	Haematology-IV	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-5481	Practical in Haematology-IV	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-5482	Pathology-III	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-5482	Practical in Pathology- III	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-5483	Clinical Biochemistry-III	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-5483	Practical in Clinical Biochemistry-III	DSC	0-0-2	-	-	4	50	-	40	10	3
BMLL-5484	Parasitology	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-5484	Practical in Parasitology	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-5485	Immunology-II	MDC-II	3-0-0	3	-	-	75	60	-	15	3
BMLP-5485	Practical in Immunology-II	MDC-II	0-0-1	-	-	2	25	-	20	5	3
BMLI-5706	Internship/ Community Outreach-I		0-0-2	-	-	4	50	40	-	10	1
VACP-5511	*Personality Development	VAC	2-0-0	2	-	-	50	40	-	10	1
Total Credits			27	Total marks			675				

***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
DSC- Discipline Specific Course
VAC- Value Added Course
MDC- Multi Disciplinary Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -VI)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLI- 6480	‡‡Training in Diagnostic Lab/ Internship	SEC	0-0-20	-	-	40	500	-	400	100	3
VACH-6401	*Human Rights and Constitutional Duties	VAC	2-0-0	2	-	-	50	40	-	10	3
Total Credits			22	Total Marks			550				

SEC- Skill Enhancement Course
VAC- Value Added Course
***Credits of these papers will not be added in SGPA/CGPA and only grades will be provided.**
‡‡A report on the basis of the training/internship will be submitted by the students and shall be evaluated by a committee of three members.

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -VII)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-7481	Pathology- IV	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-7481	Practical in Pathology- IV	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-7482	Clinical Biochemistry-IV	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP- 7482	Practical in Clinical Biochemistry-IV	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-7073	Mycology	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP- 7073	Practical in Mycology	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-7484	Molecular Biology	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-7484	Practical in Molecular Biology	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-7485	Medical Lab Management	Minor	4-0-0	4	-	-	100	80	-	20	3
BMLI-7706	Internship/ Community Outreach-II		0-0-2	-	-	4	50	-	40	10	3
Total Credits			22	Total Marks			550				

DSC- Discipline Specific Course

Bachelor of Science (Honours) Medical Laboratory Technology (Semester -VIII)											
Course Code	**Course Title**	**Course Type**	**Total Credits (L-T-P)**	**Credit Hours**			**Total Marks**	**Marks**			**Exam Time in Hrs**
				L	**T**	**P**		**L**	**P**	**CA**	
BMLL-8481	Biochemical Reactions	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-8481	Practical in Biochemical Reactions	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-8482	Cell Structure and Functions	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-8482	Practical in Cell Structure and Functions	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-8483	Techniques in Medical Lab Technology	DSC	3-0-0	3	-	-	75	60	-	15	3
BMLP-8483	Practical in Techniques in Medical Lab Technology	DSC	0-0-1	-	-	2	25	-	20	5	3
BMLL-8484	Blood Banking and Transfusion Medicine	DSC	4-0-0	4	-	-	100	80	-	20	3
BMLL-8485	Ethical conduct and Basic Bioethics	Minor	4-0-0	4	-	-	100	80	-	20	3
Total Credits			20	Total Marks			500				

DSC- Discipline Specific Course

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Basics of Human Physiology - I
Course Code: BMLL-1483
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand various parts of brain and their transmission signals.

CO2: Understand autonomous nervous system

CO3: Know about physiology of muscle function

CO4: Know about circulatory system

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I

(Session 2024-28)

Course Title: Basics of Human Physiology - I

Course Code: BMLL-1483

(THEORY)

Credits: 3-0-0	**Total Marks: 75**
Time: 3 Hours	**Theory: 60**
	CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Functions of Principal Parts of the Brain (brain stem, cerebellum, diencephalon, cerebrum),
Action potential, resting membrane potential, Transmission of signal in nervous system, Neurotransmitters, neurotransmitter receptors

Unit -II

Autonomic nervous system, Sympathetic and Parasympathetic Divisions of the ANS, Physiology of Reflex action, Special senses – Hearing, vision, pain, touch, taste

Unit -III

Physiology of muscular system, Sliding filament mechanism of muscle contraction, The contraction cycle, The Neuromuscular Junction

Unit -IV

Physiology of circulatory system, Cardiac cycle, Heart and circulation, Blood pressure, Role of hemoglobin in regulation of respiration, Functions of blood and lymphatic system, Blood clotting.

Books Recommended

1. Guyton, A.C. and Hall, J.E. (2016). Textbook of Medical Physiology. Elsevier Publications, New York

2. Ross and Willson (2010) Anatomy and Physiology. ELBS publication

3. Tortora, G.J. and Grabowski, S.R. (2009). Principles of Anatomy and Physiology. Harper Collins College Publishers
4. Tortora, G.J and Henderson S.R. (2012) Principles of Anatomy and Physiology. Harper Collins College Publishers

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Practical in Basics of Human Physiology - I
Course Code: BMLP- 1483
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Observe joint movements

CO2: Measure blood pressure and pulse rate

CO3: Estimate bleeding time, hemoglobin content and clotting time

CO4: Use and care of micropipette.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I

(Session 2024-28)
Course Title: Practical in Basics of Human Physiology-I
Course Code: BMLP- 1483
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Movements at joints
2. Blood pressure and pulse rate estimation
3. Study of Bleeding time
4. Study of clotting time
5. Estimation of hemoglobin concentration
6. Use and care of Micropipette

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Basics of Human Anatomy - I
Course Code: BMLL-1484
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand anatomy of skeleton system

CO2: Understand muscular system

CO3: Know about anatomy of circulatory system

CO4: Know about respiratory system

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I

(Session 2024-28)

Course Title: Basics of Human Anatomy - I

Course Code: BMLL-1484

(THEORY)

Credits: 3-0-0 **Total Marks: 75**

Time: 3 Hours **Theory: 60**

CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Brief anatomy of Skeletal system, Types of bones,

Ossification and growth of bone, Histology of bone, Fracture and repair, Classification of joints

Unit- II

Muscular system –Types of muscular tissue, properties of muscular tissue, Anatomy of smooth, cardiac, skeletal muscle, Microscopic Anatomy of a Skeletal Muscle Fiber, neuromuscular junction.

Unit- III

Brief anatomy of Circulatory system — Blood Composition, Anatomy of heart and blood vessels, Classification of blood vessels, Overview of arterial, venous system and lymphatic system.

Unit- IV

Brief anatomy of Respiratory system — Brief description of constituent parts, Microscopic anatomy of a lobule of the lungs, Structural components of an alveolus, olfactory receptors

Books Recommended

1. Drake, R., Vogl, W. and Mitchell, A. (2015). Gray's Anatomy for Students. Churchill Livingstone, USA.

2. Marieb, E.N. (2004). Human Anatomy and Physiology. Dorling Kindersley (India) Pvt.Ltd., 6th ed.

3. Ross and Willson (2010). Anatomy and Physiology. ELBS Publication.

4. Standring, S. (2008). Gray's Anatomy. Churchill Livingstone, USA. 40th ed.

5. Tortora, G.J. and Grabowski, S.R. (2002). Principles of Anatomy and Physiology. Harper Collins College Publishers.

6. Tortora, G.J. and Henderson, S.R. (2012). Principles of Anatomy and Physiology. Harper Collins College Publishers.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Practical in Human Anatomy-I
Course Code: BMLP- 1484
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Observe positions of various parts of human body

CO2: Know about various bones

CO3: Understand bone surface markings

CO4: Understand division of skeleton system

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Practical in Human Anatomy-I
Course Code: BMLP- 1484
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Anatomical positions and terminology — Superior, Inferior, Anterior, Medial, Posterior, Lateral, Proximal, Distal, External, Internal, Parietal, Visceral, Cavities and Planes of human body
2. Parts of a bones
3. Bone surface markings
4. Division of Skeletal system

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Principles of Biochemistry
Course Code: BMLL-1485
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand basic structure and function of Carbohydrates

CO2: Understand role of lipids and nucleic acids in human body

CO3: Learn about classification, structure and function of proteins

CO4: know about role and importance of vitamins and enzymes

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Principles of Biochemistry
Course Code: BMLL-1485
(THEORY)

Credits: 3-0-0 **Total Marks: 75**

Time: 3 Hours **Theory: 60**

CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Introduction: Principles of living organisms; Elements of living organisms; Fitness of Biomolecules.

Carbohydrates: Definition; Classification of carbohydrates; Structure and functions of various classes of carbohydrates; Monosaccharides, Disaccharides, Polysaccharides

Unit- II

Lipids: Definition; Classification of lipids; structure and functions of various classes of lipids; Triglycerides; Phosphoglycerides; Sphingolipids; Terpenes; Steroids; Eicosanoids; fatty acids and essential fatty acids.

Nucleic acids: Nitrogen bases: Purines and Pyrimidines; Nucleosides and Nucleotides, DNA Structure and its forms; RNA and its types; Differences between DNA and RNA; Biologically important nucleotides.

Unit- III

Proteins: Classification and structures of amino acid; Essential and non essential amino acids, unusual and non-protein amino acids; Important peptides and their functions; Organizational levels of protein structure; Functional and structural classification of proteins.

Unit -IV

Vitamins: Definition; chemistry and functions of water and fat soluble vitamins.

Enzymology: Enzyme nomenclature; Classification and characteristics of enzymes; Enzyme specificity; Cofactors; Co-enzymes and Prosthetic groups; Types of enzyme inhibition; Factors affecting enzyme activity

Books Recommended:

- Nelson DL and Cox MM. (2013) Lehninger Principles of Biochemistry, 6th Edition. Macmillan Worth Publishers, New Delhi.
- Berg JM, Tymoczko JL, Gatto GJ and Stryer L (2015) Biochemistry,8th Edition, WH Freeman & Co., New York.
- Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Weil PA (2015) Harper's Illustrated Biochemistry, 30thEdition, McGraw-Hill Medical Canada.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Practical in Principles of Biochemistry
Course Code: BMLP- 1485
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Learn the preparation of solutions and their use

CO2: Understand working and use of various laboratory equipment

CO3: Learn about handling laboratory equipment in clinical labs.

CO4: Perform Volumetric analysis of solutions

Bachelor of Science (Honours) Medical Laboratory Technology Semester–I
(Session 2024-28)
Course Title: Practical in Principles of Biochemistry
Course Code: BMLP- 1485
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Introduction to Biochemistry Laboratory: General Glassware, Equipment: use of analytical balance and general safety measures.
2. Cleaning of glassware: preparation of chromic acid
3. Calibration of Laboratory equipment
4. Preparation of reagents
    a. Preparation of distilled water
    b. Preparation of 1N NaOH
    c. Preparation of 1N HCl
    d. Preparation of normal saline
5. To demonstrate the phenomenon of Dialysis
6. Use of pH meter and preparation of Buffer.
7. Use of Centrifuge with different types of Rotor
8. Use of spectrophotometer and colorimeter.
9. To find the absorption maxima of a dye.
10. To find the absorption maxima of aromatic amino acids.
11. To demonstrate Beer- Lambert's Law.
12. Volumetric analysis- acid base titration

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Hematology-I
Course Code: BMLL- 2483
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Perform basic hematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.

CO2: Correlate hematological findings with those generated in other areas of the clinical Laboratory.

CO3: Diagnose patient symptoms and clinical history

CO4: To make appropriate and effective on-the-job professional decisions.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Hematology-I
Course Code: BMLL- 2483
(THEORY)

Credits: 3-0-0 **Total Marks: 75**

Time: 3 Hours **Theory: 60**

CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Introduction to Hematology: Definition and significance of hematology, Blood and its various components, Erthropoiesis, Leucopoeisis, Thrombopoeisis, Leucocytes, Development of Blood corpuscles, red blood cells in general blood circulation.

Unit- II

Hemoglobin and its various types of Hemoglobin, Iron metabolism, Hemoglobin derivatives

Unit- III

Hematological Disorders: Anemia, various types of anemia, Megaloblastic Anemia, Iron deficiency Anemia, Hemolytic Anemia, Perinicious Anemia, Siderobalstic anemia, Sickle Cell anemia.

Unit-IV

Thalassemia, Polycythemia, Leukemia, Multiple Myeloma, Di-Gugliemo Syndrome, Hereditary Spherocytosis, Hereditary Elliptocytosis, Haemolytic disease of newborn, Infectious Mononucleosis, Parasitic infections of blood.

Books Recommended:

- Godkar, PB and Godkar, DP (2008) Text Book of Medical Laboratory Technology, 2nd edition Bhalani Publishing House, Mumbai, India.
- Martin R. Howard & Peter J Hamilton (2013)Text Book of Hematology, 4thedition, ChurchillLivingstone.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Practical in Hematology-I
Course Code: BMLP- 2483
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Perform basic hematological laboratory testing, assess laboratory data and report findings according to laboratory protocol.

CO2: Adapt hematology laboratory techniques and procedures when errors and discrepancies in results are obtained to effect resolution in a professional and timely manner.

CO3: Distinguish normal and abnormal hematological laboratory findings to predict the diagnosis of hematological disorders and diseases.

CO4: Recognize laboratory results consistent with leukemia and other white blood cell disorders.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Practical in Hematology-I
Course Code: BMLP- 2483
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Basic requirements for Hematology laboratory
2. Glassware for Hematology
3. Equipments for Hematology
4. Anticoagulant vial preparation
5. Complete Blood Count
6. Determination of Hemoglobin
7. RBC count by Hemocytometer
8. TLC by Hemocytometer
9. Differential Leukocyte count
10. Determination of Platelet Count

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Basics in Human Physiology - II
Course Code: BMLL- 2484
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand physiology of respiratory system and olfaction.

CO2: Learn about digestion and various receptors associated with digestion.

CO3: Study male and female reproductive system and their physiology.

CO4: Understand physiology of excretory system and endocrine glands.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II

(Session 2024-28)

Course Title: Basics in Human Physiology - II
Course Code: BMLL- 2484
(THEORY)

Credits: 3-0-0 **Total Marks: 75**

Time: 3 Hours **Theory: 60**

CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Physiology of respiratory system, external and internal respiration, Transport of oxygen (O2) and carbon dioxide (CO2) in the blood, chemical reactions that occur during gas exchange, Physiology of olfaction.

Unit-II

Physiology of digestive system, Digestive Enzymes, functions of the liver, Absorption of digested nutrients in the small intestine, faeces formation and defecation, Physiology of taste, Gustatory receptor.

Unit-III

Physiology of Male and Female Reproductive System, Hormonal control of spermatogenesis, Hormonal Regulation of the Female Reproductive Cycle, Menstruation

Unit-IV

Physiology of excretion, functions of kidneys, urine formation, Regulation of body fluids by kidneys, Basics functions of endocrine glands.

Books Recommended:

1. Guyton, A.C. and Hall, J.E. (2016). Textbook of Medical Physiology. Elsevier Publications, New York.

2. Ross and Willson (2010) Anatomy and Physiology. ELBS publication.

3. Tortora, G.J. and Grabowski, S.R. (2009). Principles of Anatomy and Physiology. Harper Collins College Publishers.

4. Tortora, G.J and Henderson S.R. (2012) Principles of Anatomy and Physiology. Harper Collins College Publishers.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Practical in Basics of Human Physiology - II
Course Code: BMLP- 2484
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Know and use of microscope

CO2: Calculate leukocyte count

CO3: Determine Differential leukocyte

CO4: Learn about osmotic fragility of RBC

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Practical in Basics of Human Physiology - II
Course Code: BMLP- 2484
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Study the parts of Microscope
2. Use and care of Microscope
3. To determine Total leucocyte count
4. To determine Differential leucocyte count using Leishman's stain
5. Osmotic fragility of RBC

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Basics of Human Anatomy-II
Course Code: BMLL- 2485
(THEORY)

Course Outcomes

After passing this course the student will be able to:

CO1: Understand anatomy of nervous system.

CO2: Learn about Integumentary system.

CO3: Study anatomy of digestive and urinary system.

CO4: Understand anatomy of reproductive.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Basics of Human Anatomy-II
Course Code: BMLL- 2485
(THEORY)

Credits: 3-0-0 **Total Marks: 75**

Time: 3 Hours **Theory: 60**

CA: 15

Instructions for paper setter: Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Brief anatomy of Nervous system — Structure of brain and spinal cord, Parts of a Neuron, Neuroglia, Ion channels, Ascending and descending tracts of neurons, Autonomic nervous system, Special senses - Eye, ear.

Unit-II

Integumentary system - Skin, hair, nail, touch receptors, Types of cells in the epidermis, Layers of the epidermis, Endocrine system – Brief anatomy of endocrine glands, Glands and their hormones (Hypothalamus, Pituitary, Thyroid, Parathyroid, Adrenal, Pancreatic Islets, Thymus, Pineal Gland, Ovaries and Testes).

Unit-III

Brief anatomy of Digestive system, Histology of stomach, Liver, Gallbladder, pancreas, small intestine, large intestine, Urinary system — Anatomical and histological description of kidneys, structure of nephrons.

Unit-IV

Brief anatomy of Reproductive system - Brief anatomical description of male and female reproductive organs, Female Reproductive Cycle, Birth Control Methods and Abortion

Books Recommended

1. Drake, R., Vogl, W. and Mitchell, A. (2015). Gray's Anatomy for Students. Churchill Livingstone, USA.

2. Marieb, E.N. (2004). Human Anatomy and Physiology. Dorling Kindersley (India) Pvt.Ltd., 6thed.

3. Ross and Willson (2010). Anatomy and Physiology. ELBS Publication.

4. Standring, S. (2008). Gray's Anatomy. Churchill Livingstone, USA. 40th ed.

5. Tortora, G.J. and Grabowski, S.R. (2002). Principles of Anatomy and Physiology. Harper Collins College Publishers.

6. Tortora, G.J. and Henderson, S.R. (2012). Principles of Anatomy and Physiology. Harper Collins College Publishers.

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)

Course Title: Practical in Basics of Human Anatomy-II
Course Code: BMLP- 2485
(PRACTICAL)

Course Outcomes

After passing this course the student will be able to:

CO1: Know and use of microscope

CO2: Calculate leukocyte count

CO3: Determine Differential leukocyte

CO4: Learn about osmotic fragility of RBC

Bachelor of Science (Honours) Medical Laboratory Technology Semester–II
(Session 2024-28)
Course Title: Practical in Basics of Human Anatomy - II
Course Code: BMLP- 2485
(PRACTICAL)

Credits: 0-0-2 **Total Marks: 50**

Time: 3 Hours **Theory: 40**

CA: 10

1. Classification of bones, Skull – different views
2. Sex differentiation in skull
3. Study of different types of Vertebrae, Sternum, Scapula
4. Bones of upper and lower limbs, Pectoral girdle, pelvic girdle, Clavicle, Ribs, sacrum

ANNEXURE F

FACULTY OF LIFE SCIENCES

Syllabus

Master of Science (Zoology)

(Under Credit Based Continuous Evaluation Grading System)

(SEMESTER: I-II)

Session: 2024-26

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

Master of Science (Zoology)

Session 2024-26

Program Specific Outcomes

1. Understand and analyse the ecological and evolutionary principles such as evidences of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life and their economic importance. they will be able to use specific examples to explicit how descent with modification has shaped animal morphology, physiology, life history and behaviour.
2. Understanding of fundamental concepts of various branches of zoology and efficiency in computational tools, numerical methods relevant to zoology.
3. Acquire proficiency in experimental techniques, data analysis and drawing conclusions in zoology.
4. Ability to critically evaluate scientific literature, synthesize information from multiple sources and apply scientific reasoning to solve problems in zoology and related fields.
5. Demonstrate knowledge to acquire, articulate, retain and employ practical skills relevant to fundamentals of computer, molecular techniques and statistical tools.
6. Students will be able to apply their knowledge of zoology to address real world challenges in areas such as animal ecology, wildlife management, biotechnology, applied zoology and taxonomy.
7. Demonstrate adaptability to emerging technologies and tools relevant to the field of zoology and enhance communication skills for effectively presenting scientific findings and collaborating within interdisciplinary teams.
8. Understand how the chemistry and structure of the major biological macromolecules, including nucleic acids to know their biological properties and determine relationship of variations in phenotypic expression of genome and their genome wide interactions with other organisms.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Session-2024-26

Master of Science (Zoology) Semester-I

Course Code	Course Name	Course Type	Hours Per Week	Credit	Total Credit	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MZOL-1481	Functional Organization of Animals–I	C	4	4-0-0	4	80	-	20	100	3
MZOL-1482	Animal Ecology	C	4	4-0-0	4	80	-	20	100	3
MZOL-1483	Cell Biology	C	4	4-0-0	4	80	-	20	100	3
MZOL-1484	Concepts of Biotechnology	C	4	4-0-0	4	80	-	20	100	3
MZOM-1135	Computer Programming and Data Processing	C	4	2-0-1	3	40	20	15	75	3+3
MZOP-1486	Practical-I(Functional Organization of Animals-I)	C	4	0-0-2	2	-	40	10	50	3
MZOP-1487	Practical-II(Ecology and Cell Biology)	C	4	0-0-2	2	-	40	10	50	3
Students can opt any one of the following interdisciplinary **optional** courses		**IDE**			4	80		20	100	3
Total					**23**				**575**	

IDEC-1101 IDEM-1362 IDEH-1313 IDEI-1124 IDEW-1275	• Communication Skills • Basics of Music (Vocal) • Human Rights and Constitutional Duties • Basics of Computer Applications • Indian heritage: Contribution to the World

IDE–Inter Disciplinary Elective/Optional Course

***Credits/Grade points of the courses will not be included in the SGPA/CGPA of semester.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Session2024-26

Master of Science (Zoology) Semester-II

Course Code	Course Name	Course Type	Hours Per Week	Credits	Total Credits	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MZOL-2481	Functional Organization of Animals–II	C	4	4-0-0	4	80	-	20	100	3
MZOL-2482	Applied Zoology-I (Invertebrates)	C	4	4-0-0	4	80	-	20	100	3
MZOL-2483	Evolution	C	2	2-0-0	2	40	-	10	50	3
MZOL-2334	Biostatistics	C	4	4-0-0	4	80	-	20	100	3
MZOS-2485	Seminar	C	4	0-0-2	2	-	40	10	50	3
MZOP-2486	Practical-III (Functional Organization of Animals–II)	C	4	0-0-2	2	-	40	10	50	3
MZOP-2487	Practical-IV (Evolution and Applied Zoology-I)	C	4	0-0-2	2	-	40	10	50	3
Total					**20**				**500**	

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Functional Organization of Animals-I
Course Code: MZOL-1481
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understand the mechanism of digestion in chordates and non-chordates.
- CO2. Understand the blood composition, types, groups and circulatory system.
- CO3. Familiarize with the physiology of respiratory system of chordates & non-chordates.
- CO4. Understand the physiology of excretory system and come to know the physiology of reproductive system.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Functional Organization of Animals–I
Course Code: MZOL-1481
(Theory)

Examination Time: 3 hr **Maximum Marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Nutrition and Digestion
Ingestion of soluble food and particulate food in relation to habitat and habits Symbiotic nutrition
Mechanism of digestion and regulation of secretion in non-chordates and chordates

Unit–II

Transport and circulatory mechanisms
Intracellular transport in Protozoa
Circulation of external medium of transport within the body of sponges and cnidarians Open and closed types of circulatory system
Chambered, tubular and ampullary hearts
Neurogenic and myogenic hearts
Evolution of Heart and Cardio vascular system

Unit–III

Respiratory System
Respiratory organs in aquatic animals and aquatic respiration Respiratory organs and aerial mode of respiration
Distribution and brief chemistry of respiratory pigments and their function in nonchordates and chordates

Unit–IV

Excretion and Reproduction
Excretory structures and waste disposal in non-chordates, coelom, coelomic ducts, nephridia, antennal / green glands, malpighian tubules
Regulation of water salt balance
Pattern of reproduction in non-chordates and their larval forms
Evolution of the urinogenital system in chordates with special reference to the separation of the two systems

Suggested Reading Material:

- Barrington, E.U.W. (1967), Invertebrates Structure and Functions. Houghton Mifflin Co. Boston.
- Barth, R. H. and Broshears, R. E. (1982), The Invertebrate world. Holt Saunder, Japan.
- Brusca, R. C. and Brusca, G. J. (2003), Invertebrates second edition. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
- Cooper, G.M.(2004), The Cell: A Molecular Approach IIIrd edition, ASM Press, Washington, D.C.
- 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.
- Hill, R.W., Wyse, G. K. and Anderson, N. (2004), Animal physiology. Sinauer Associate, INC. Pub. Saunder land, Massachusettes, USA.
- Hoar, W. S. (1984), General and Comparative Physiology. Prentice Hall of India Pvt. Limited, New Delhi, India.
- Karp, G. (2005), Cell and Molecular Biology; concepts and experiments (4th ed.), Hoboken, John Willy and Sons, New York.
- Meglitsch, P.A. and Schran, F.R. (1991), Invertebrate (Zoology) 3rdEd. Oxford University Press, NewYork.
- Pechenik, A. Jan. (2000), Biology of the invertebrates, Fourth Edition, McGraw Hill Book Co. Singapore.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Animal Ecology
Course Code: MZOL-1482
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Demonstrate and understand the ecological relationships between organisms and their environment.
- CO2. Explain and identify the role of the organism in energy transfers.
- CO3. Understand various types of adaptations and ecology of population
- CO4. Understand the applied aspect of ecology.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Animal Ecology
Course Code: MZOL-1482
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Introduction and History of Ecology
Structure and Functions of some special types of ecosystems (Grasslands, forests, deserts, aquatic ecosystems and agroecosystem)
Abiotic factors
Temperature, Moisture, Light, fire, Malentite, Pollution

Unit–II

Biotic Factors
Analysis of Environment
Place in which to live
Community Structure
Ecological Niche, Food chains, Food webs, biomagnifications, succession/temporal changes

Interactions and Coactions
Intraspecific Interactions
Interspecific Interactions
Predation, Parasitism, Commensalism, Mutualism etc

Unit-III

Adaptations
Cave, deep sea, arboreal, aerial, and subterrestrial
Co-adaptations and adaptive resemblances (mimicry, warning colouration, seasonal polymorphism)
Population Ecology
Concept of Population
Biotic potential and carrying capacity, dispersal and distribution

population growth and its regulations
Methods of sampling
Life tables, longevity, Migration

Unit–IV

Applied Ecology
Anthropogenic interferences
Biomonitoring of environment using animal species
Modeling and Use of remote sensing (GIS) in ecology (introduction)
Overview of sustainable development of ecosystems

Bio Geography
Zoo Geographical regions
Island ecology (endemicity)

Suggested Reading Material:

- 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.
- Odum, E.P.(1983),Basic Ecology.
- Putmann, R. J. and Wratten, S.D. (1984), Principles of Ecology, Crown Helm, London.
- Salanki, J., Jeffery E. and Hughes G.M. (1994), Biological Monitoring of the Environment (Amanualof Methods) CAB International, Wallingford UK.
- Rastogi, V.B. (2018). Animal Ecology. Kalyani Publishers.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Cell Biology
Course Code: MZOL-1483
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Describe the ultra-structure and functions of cell organelles.
- CO2. Understand DNA replication, RNA and protein synthesis and come to know protein synthesis can be controlled at the level of transcription and translation.
- CO3. Understand cell signaling and cellular communication.
- CO4. Understand the types and applications of stem cells.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Cell Biology
Course Code: MZOL-1483
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Introduction
Cell–a unit of structure and function, cell theory Prokaryotes and eukaryotes cells
Cytoskeleton
Actin filament, Myosin, Intermediate filament, microtubules
Structure of Cell Membrane
Chemical composition
Various Lipoprotein models including fluid mosaic model
Nucleus
The Nuclear Envelope and Traffic between
the Nucleus and the Cytoplasm
Internal Organization of the Nucleus
The Nucleolus and rRNA Processing

Unit–II

Ribosomes
Prokaryotic and Eukaryotic ribosomes
Role of ribosomes in protein synthesis in prokaryotes and eukaryotes
Golgi complex
Structure and Function of: Cisternae, vacuoles and vesicles Types of
Vesicle Transport and their functions
Protein sorting and targeting GERL concept
Endoplasmic Reticulum
Structure and Function of endoplasmic reticulum
Membrane synthesis in the ER
Mechanism ensuring destruction of misfolded protein ER to Golgi vesicular transport

Unit-III

Mitochondria
Structure and Functions
Oxidative metabolism in the Mitochondrion Role of Mitochondria in the formation of ATP Electron-Transport complexes
Lysosomes
Lysosomal acid hydrolases Endocytosis and Lysosome formation Lipofuscin pigments
Peroxisomes
Functions of peroxisomes Glyoxylate pathway Peroxisome assembly

Unit–IV

Cell signaling
Signaling molecules and their receptors
Functions of cell surface receptors Pathways of intracellular signal transduction Signal transduction and the cytoskeleton
Cell Cycle
Various cell cycle check points Cyclin and cyclin dependent kinases Regulation of CDK- cyclin activity

Suggested Reading Material:

- Alberts, B. Bracy, P. Lewis, J. Raff, M. Roberts K and Watson, J. (eds) (1994). Molecular Biology of the Cell, Garland Publishing, New York.
- Avers, C.J. (1976). Cell Biology, VanNostr and Reinhold, New York.
- Cooper, G.M. (2004). The cell, A Molecular Approach ASM press, Washington, D.C.
- Darnell, J. Lodish, H. and Baltimore, D. (2004). Molecular Cell Biology, 2nd edition, Freeman, New York.
- Derobertis, E. D. P. and Derobertis, E.M.F. (1987). Essentials of Cell and Molecular Biology. Hold Saunders – Philadelphia.
- Karp,G. (1984). Cell Biology 4th Edition, McGraw Hill, New York.
- Karp G. (1999). Cell and Molecular Biology. Concepts and Experiments, 2nd Editon John Wiley and Sons, Inc. New York, Brisbane, Toronto.
- Powar, C.B. (1990). Cell Biology. Himalaya Publishing House, Bombay.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Concepts of Biotechnology
Course Code: MZOL-1484
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Describe cell culture and cell lines.
- CO2. Understand molecular markers and vectors used in biotechnology fields.
- CO3. Understand various techniques in biotechnology.
- CO4. Understand the types and applications hybridoma technology and vaccines.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Concepts of Biotechnology
Course Code: MZOL-1484
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Brief introduction to Biotechnology
Cell culture and medium
Cell culture, Cell lines, protocol cryo-preserving cultured cells, cell viability and cell proliferation
Restriction Enzymes
DNA ligase, Klenow enzyme, T4 DNA polymerase, Polynucleotide kinase, Alkaline phosphatase
Stem Cells and Tissue engineering
Embryonic stem cell, adult stem cells, stem cell differentiation

Unit–II

Markers and Vectors Molecular markers
RFLP, RAPD, SSLP markers
Vectors
Plasmid vectors, Bacteriophage vectors, Cosmids, M13, Phagemids, Fosmids, BACs and YACs
Cloning
Gene cloning and sequencing, cDNA cloning, Identification of Specific clone with a specific probe, Practical applications of gene cloning

Unit–III

Techniques
Principal, theory and application of Southern, Northern, Western Blotting
Polyacrylamide gel electrophoresis (PAGE)
Polymerase chain reaction (PCR)
DNA finger printing
DNA foot printing
In situ hybridization
Restriction fragment length polymorphism (RFLP)

Unit–IV

Hybridoma Technology
Immunization of animals:
isolation of stimulated spleen cells
Myeloma cell lines used as fusion partners
Fusion methods
Monoclonal antibodies
Detection and applications
Vaccines
Conventional vaccines
Viral vaccines
Peptide vaccines
Genetically engineered vaccines
Production and applications of Cytokines

Suggested Reading Material:

- Spier, R.R. and Griffttths, J.B. (1994). Animal Cell Biotechnology, 6thEd., Academic Press, London.
- Krogsgaard-larsen, P., Liljefors T., Madsen U. and Larsen K, Liljefors T. Madsen U. (2016). Textbook of Drug Design and Discovery, 5 th Ed. Taylor and Francis Publications, Washington D.C.
- Gupta, P. K. (1996). Elements of Biotechnology, Rastogi and Co., Meerut.
- Henry, R.J. (1997). Practical Applications of Plant Molecular Biology, Chapman and Hall.

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Computer Programming and Data Processing
Course Code: MZOM-1135

COURSE OUTCOME

After passing this course the student will be able to:

- CO1. Comprehend computer fundamentals, operating system concepts and office automation software.
- CO2. Work with complete office suite for making spreadsheets, documents and presentations.
- CO3. Comprehend basics of C Programming Language.
- CO4. Apply various control statements and arrays of C Programming Language for designing solutions to different real-world problems

Master of Science (Zoology) Semester–I
Session 2024-26
Course Title: Computer Programming and Data Processing
Course Code: MZOM-1135

Examination Time: (3+3) Hours **Maximum Marks: 75**
L-T-P: 2-0-1 **Theory: 40**
Practical:20
CA: 15

Instructions for Paper Setter-

Eight questions of equal marks (8 marks each) are to 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 divided 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

Introduction to Computer capabilities, Classifications Computer components, Introduction to hard ware and software concepts, operating systems, peripherals, I/O devices, Limitations of computer

UNIT-II

Basic Features and usage of:
Word Processing Software: Creating, Editing, Formatting and Printing document
Spreadsheet Software: Creating, Editing, Formatting and Printing a sheet
Presentation Software: Creating, Editing, Formatting and Printing a presentation

UNIT-III

Introduction to C Programming language
Program structure, elements, character set, constants, variables, data types,
identifiers, operators and expressions.
I/O Statements: print f and scan f statement.

UNIT-IV

Control statements: if, if else, else if ladder, nesting, switch, Looping statements: do while, while, for
Arrays: Basic usage, Declaration, Initialization and Types.

References/Textbooks:

1. Anshuma Sharma, Learn Programming in C, Lakhanpal Publishers,7th Edition.
2. E Balagurusamy, Programming in ANSIC, Tata Mc Graw-Hill, 2002.
3. Yashvant Kanetkar, Let UsC, BPB Publications, 2016.

4. Gurwinder Singh, Rachhpal Singh, Fundamentals of Computer and PC Software, Kalyani Publishers, 2015.
5. Anshuman Sharma, Fundamentals of Information Technology, Lakhanpal Publishers, 5th Edition.
6. Byron Gottfried, Schaum's Outline Programming with C, McGraw Hill, 1996.

Note: The latest editions of the books should be followed.

Master of Science (Zoology) Semester–I

Session 2024-26

Course Title: Practical-I (Functional Organization of Animals-I)

Course Code: MZOP-1486

(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understand the comparative anatomy of gut through demonstration.
- CO2. Understand the comparative physiology of circulatory, excretory& reproductive system through ICT based videos, presentations and charts.
- CO3. Understand Nephridia in annelids (earthworm), green glands in crustaceans, Malpighian tubules in Cockroach.
- CO4. Understand Excretory system of frog, lizard, bird and rat.

Master of Science (Zoology) Semester–I

Session 2024-26

Course Title: Practical-I (Functional Organization of Animals-I)

Course Code: MZOP-1486

(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-2 **Practical: 40**
CA: 10

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.

Study of permanent slides
Mouth parts: honeybee, housefly, cockroach, butterfly, mosquito, and bug Salivary glands
Blood smear of animals
Radula of Pila
Jaws of Leech

Using slides/charts/models/videos study of following

Anatomy of gut in relation to food and feeding habits of detritivores, carnivores, herbivores, omnivores and sanguivores
Different kinds of Heart and blood vascular system in animals
Respiratory structures: Gills (Crustaceans, Bivalves, Cephalopods, and Fish); Book Lungs (Scorpion); Trachea and spiracles (Cockroach)
Nephridia in annelids (earthworm), green glands in crustaceans, Malpighian tubules in Cockroach
Excretory system of frog, lizard, bird and rat
Histology of ovary, oviduct, uterus, testis and placenta in different groups of invertebrates and vertebrates
Reproductive organs in Hydra, Flatworm, Earthworm, Cockroach, Pila, Fish, Frog, Lizard, Bird and Rat

Note: The above-mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

Master of Science (Zoology) Semester–I

Session 2024-26

Course Title: Practical-II (Ecology and Cell Biology)

Course Code: MZOP-1487

(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understand the population estimation of Invertebrates and vertebrates using different methods.
- CO2. Describe the fine structure and functions of cell organelles.
- CO3. Perform a variety of cellular biology techniques.
- CO4. Analyze various physicochemical properties of blood.

Master of Science (Zoology) Semester–I

Session 2024-26

Course Title: Practical-II (Ecology and Cell Biology)

Course Code: MZOP-1487

(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-2 **Practical: 40**
CA: 10

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.

Population estimations
Using Mark and Release method and to study the effect of migration on them (Using colored beads).

Estimation of population
Protozoans, Nematodes and Soil arthropods

Combined population studies using quadrates
Intra-population distribution and Poisson distribution, construction of life table and survivorship curves from given data.

Analysis of following
Normal and abnormal constituents in urine sample RBC, WBC (TLC, DLC), platelet counts
Determination of ESR and PCV of human blood

Study of cell using permanent slides
Prokaryote cells: Lactobacillus, *E.coli*. Blue green algae
Eukaryote cells, Testicular material (for studies of spermatogenesis).

Microtomy
Introduction of the instrument–its use, care

Study of permanent slides of various tissues
(gut region, liver, lung, spleen kidney, pancreas, testis, ovary, tongue, skin etc.).

Study of electron micrographs of various cell organelles
Plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen and lipids etc

Note: The above-mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Functional Organization of Animals–II
Course Code: MZOL-2481
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Describe the specializations and evolution of skin and muscles.
- CO2 Describe the physiology of nervous system of human beings.
- CO3 Understand the physiology of endocrine system.
- CO4 Understand the physiology of sense organs

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Functional Organization of Animals–II
Course Code: MZOL-2481
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Integumentary System
Embryonic origin
General features of the Integument Specializations of integument Evolution of Skin
Muscular System
Classification of Muscles
Structure of Skeletal Muscles and cardiac muscle
Tendons Muscle mechanics
Muscle Function
Basis of Muscles contraction
Muscle Fiber
Muscle organs and fibers Bone-muscle lever systems

Unit–II

Skeletal System
Exo and Endo Skelet on in Invertebrates
Appendicular skeleton in vertebrates
Basic Components
Phylogeny of fishes and tetrapods
Evolution of the appendicular system
Form and Function
Swimming
Terrestrial locomotion

Unit–III

Integratory Systems
Chemical coordination of body functions through neuro-secretion in non-chordates
Physiology of nerve net and giant fibre system
Evolution of functional anatomy of brain
Endocrine System
Endocrine organs

Chemical coordination of body functions through hormones and neuro-secretions

Unit-IV

Sensory System
General sensory organs
Free sensory receptors
Encapsulated sensory receptors
Associated sensory receptors
Mechanisms of perceiving stimuli
Special sensory organs (Mechano, Radiation, Chemo and Electroreceptors)
Additional special sensory organ

Suggested Reading Material:

- Barrington, E. U. W. (1967), Invertebrates Structure and Functions. Houghton Mifflin Co. Boston.
- Barth, R.H. and Broshears, R.E (1982), The Invertebrate World. Holt Saunder, Japan.
- Brusca, R. C. and Brusca, G. J. (2003), Invertebrates Second Edition. Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
- Prosser, C.L. (1984), Comparative Animal Physiology. Satish Book Enterprise Books Seller & Publishers, Agra.
- Purves, W. K., Oriane, G. H., Space, H. C. and Salava, D. (2001), Life– The Science of Biology 6th ed., Sinauer Assoc. Inc., USA.
- Randall, D., Burggren, K.L. and French, K. (2002), Eckert Animal Physiology: Mechanisms and Adaptations. W.H. Freeman and Company, New York.
- Ruppert, E. E. and Barnes, R. D. (2004), Invertebrate ((Zoology)) 7th ed. Saunders Publ., Philadelphia.
- Willmer, P., Stone,G. and Johnston, I (2000). Environmental Physiology of Animals, Blackwell Science.
- Withers, P.C. (1992), Comparative Animal Physiology. Saunder College Publishing New York.

Master of Science (Zoology) Semester–II

Session 2024-26

Course Title: Applied Zoology–I

Course Code: MZOL-2482

(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the methods of beekeeping, diseases of honey bee and various bee products.
- CO2 Know the culture and harvesting methods of Lac and mulberry silkworm.
- CO3 Understand the various methods of prawn farming. The students will also know about the spoilage, processing and preservation of prawns.
- CO4 Understand the artificial pearl formation and economics of Vermiculture.

Master of Science (Zoology) Semester–II

Session 2024-26

Course Title: Applied Zoology–I

Course Code: MZOL-2482

(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:

Eight questions of equal marks (16 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

Apiculture

History and Introduction
Honey bee and kinds
Social organization of colony and nests
Life Cycle
Relation between honey bees and plants Flora for Apiculture
Honey composition, quality and importance
Beekeeping, selection, methods, precautions
Products of beekeeping
Bee enemies and diseases

Unit–II

Lac culture

Introduction
Lac insect species, Life cycle and Host plants
Lac composition, properties & importance
Cultivation and harvesting of Lac
Enemies of Lac insect and host plants
Lac industry in India

Sericulture

Indian sericulture industry (distribution and prospects)
Silk moth species and their Life Cycle
Silk composition, kinds and uses
Mulberry cultivation
Rearing of silkworm
Treatment and disposal of cocoons
Silk reeling, twisting and weaving
Diseases & pests of silkworm

Unit–III

Prawn Culture

Introduction to prawns
Prawn species

Freshwater prawn farming and Marine Prawn farming
Methods of Prawn farming
Spoilage and its prevention
Processing and preservation of prawns
Future of prawn culture

Unit–IV

Pearl Culture
Historical background
Pearl oyster –species
Pearl formation, composition, quality and commercial value
Artificial Culturing of Pearls
Synthetic pearls types and their manufacturing
Methods of harvesting
Problems of pearl industry

Vermiculture
Species of worms
Conditions for efficient
Vermiculture (domestic and commercial level)
Economics of Vermiculture

Suggested Reading Material:

- Bhamrah, H. S. & Juneja, K. (2001), An Introduction to Mollusca. Anmol Publications Pvt. Ltd. New Delhi.
- Bhatnagar, R. K. and Palta, R. K. (2003), Earthworm; Vermiculture and Vermicomposting, Kalyani Publishers India.
- Carter, G.A. (2004) Beekeeping, Biotech Books, New Delhi.
- Fenermore, P.G. and Prakash, A. (1992), Applied Entomology, Wiley Eastern Ltd. New Delhi
- Ghorai, N. (1995), Lac Culture in India. International Books and Periodicals, New Delhi.
- Jhingran, V.G. (1991) Fish and Fisheries of India, Hindustan Publishing Company India.
- Kumar, A. and Nigam, P.M. (1989), Economic and Applied Entomology EMKAY Publishing Co. New Delhi.
- Mishra, R. C. (1995), Honey Bees & their Management in India. ICAR, New Delhi.
- Mustafa, S. (1990) Applied and Industrial (Zoology). Associated Publishing Company, New Delhi.
- Shukla, G.S. & Upadhaya, V.B. (1991-92), Economic (Zoology), Rastogi Publications, Meerut.
- Sathe, T.V. and Jadhav, A.D. (2001) Sericulture and Pest Management, Daya Publishing House, New Delhi.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Evolution
Course Code: MZOL-2483
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1 Understand the process of origin of life and evidences of organic evolution.
- CO2 Understand the variations in animals and how natural selection operates.
- CO3 Explain how speciation and extinction takes place and distribution of species.
- CO4 Explain how the molecular aspects provides evidence for evolution.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Evolution
Course Code: MZOL-2483
(Theory)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 2-0-0 **Theory: 40**
CA: 10

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

Origin of Life
Origin of Micro molecules
Origin of Macromolecules
Origin of Viruses
Origin of Prokaryotes
Origin of Unicellular eukaryotes and multicellularity
Organic Evolution
Theories (Lamarckism and Darwinism)
Evidences
Separation of kingdoms

Unit–II

Variations
Types of variations
Causes of variations
Mutation rates and directions
Natural Selection
Types of selection
Selection forces
Experimental demonstration of Natural selection
Industrial melanism and polymorphism
Sexual selection
Selection and non-adaptive characters

Unit–III

Speciation
Isolation and its types
Gradual and abrupt
Origin of higher categories
Distribution of Species

Island, Ocean and Continental distribution
Theories of continental drift

Extinction
Kinds of extinction and causes of extinction
Major extinctions

Unit – IV

Quantitative and Molecular Aspects of

Evolution

Hardy-Weinberg law
Genetic drift
Selection pressure
Mutation pressure
Migration
Meiotic drive

Brief account of
Evolution of genome in viruses, prokaryotes and eukaryotes
Evolution of sexual reproduction
Molecular clocks
Evolution of Horse, Elephant, Man (in brief)
Future Course of Evolution

Suggested Reading Material:

- Avers, C. J. (1989). Evolution - Process and Pattern in Evolution Oxford University, Press, New York, Oxford.
- Ayala, F.J. and Valentine J.W. (1979). Evolving the theory and Process of Organic Evolution, Benjamin Cumming.
- Brook field, A. P. (1986). Modern aspects of Evolution. Hutchinson London, Melbourne.
- Gallow, P. (1983). Evolutionary principles. Chapman and Hall.
- Freeman, S. and Herron, Jon C. (2007). Evolutionary analysis Pearson Prentice Hall, New Jersey.
- Futuyma, D.J. (1998), Evolutionary Biology, Sinauer Assoc. Inc. Pub. USA.
- Meglitsch, P.A. (1991), Invertebrate (Zoology) (3rdedition), Oxford University Press.
- Minkoff, E. C. (1983), Evolutionary Biology, Addison Wesley Pub. Co., London.
- Wen-Hsiung Li (1997), Molecular Evolution, Sinauer associates Inc.Pub.USA.

Master of Science (Zoology) Semester II
Session: 2024-26
Course Title: Biostatistics
Course Code: MZOL-2334
(Theory)

COURSE OUTCOMES

After the Successful Completion of the subject students will be able to

- CO 1 Know how to collect, analyze and interpret data and use this data to find out different measures of central tendency, dispersion, skewness, kurtosis and moments. They able to define event, outcome, trial, simple event, sample space and calculate the probability of events for more complex outcomes related to conditional, additive and multiplicative law of probability.
- CO 2 Able to use and stimulate random variable, distribution function, probability mass function and probability density function using calculus to answer the quantitative questions about the outcome of probabilistic systems. And also understand the concept of mathematical expectation and use it to find out the mean, variance, standard deviation, kurtosis etc. of different probability distributions like Binomial, Poisson and Normal etc.
- CO 3 Use Correlation to identify the strength and direction of a linear relationship between two variables and using Regression to predict how much a dependent variable changes based on adjustments to an independent variable and also apply Karl Pearson Correlation coefficient and Spearman's Rank Correlation and Least Square technique for Regression lines.
- CO4 Understand how to develop Null and Alternative Hypothesis and examine the process of Hypothesis testing with reference to one or two tailed test at a given level of significance. Also manage to solve problems using t, Z and Chi-Square test and will be able to describe the use of ANOVA for one way and two way classified data with one observation per cell.

Master of Science (Zoology) Semester II
Session: 2024-26
Course Title: Biostatistics
Course Code: MZOL-2334
(Theory)

Examination Time: 3 Hrs **Maximum Marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16marks 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.
The students can use only Non Programmable & Non Storage Type Calculator and statistical tables.

UNIT-I

Statistical Method: Collection of data. Frequency distribution and its graphical representation. Measures of central tendency, dispersion, moments, skewness and kurtosis
Probability: Random experiments, sample space, events. Mathematical definition of probability of an event. Use of permutations and combinations in calculations of probability, Conditional probability, Additive and multiplication law of probability.

UNIT-II

Random variables and its pmf, pdf, cdf, mathematical expectation and variances, Distribution of binomial, Poisson and normal variables and (without derivation)

UNIT-III

Correlation and Regression: Relationship between variables, covariance, Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, interpretation of correlation coefficients, Least square technique for regression lines (without proof), regression coefficients, relationship between correlation analysis and regression analysis.

UNIT-IV

Hypothesis Testing: Sample statistics and parameters, population null hypothesis, level of significance. Definitions of Chi-square test, , Application of X2-test as a goodness of fit and association of attributes, t-test as a test of single and difference of means and F-test as a test of equality of population variances in testing of hypothesis.
Analysis of Variance: Analysis of variance for one-way classified data.

Reference Books

1. P.N. Arora, P.K. Malhan, Biostatistics, Himalaya Publishing House, Mumbai, Reprint 2013.
2. S.C. Gupta, V.K. Kapoor, Fundamental of Mathematical Statistics, Sultan Chand

& Sons, Twelth Edition, 2020

3. E. Batschelet, Introduction to Mathematics for Life Scientists, Springer Publisher, Third Edition, 1979.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Seminar
Course Code: MZOS-2485

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Express their innovative ideas & creativity on any scientific phenomenon & develop interest in research aptitude.
- CO2. Buildup confidence for public speaking.
- CO3. Improve their presentation skills.
- CO4. Learn to study literature

Master of Science (Zoology) Semester–II

Session 2024-26

Course Title: Seminar

Course Code: MZOS-2485

Examination Time: 3 hrs **Maximum marks: 50**

L-T-P: 0-0-2 **Theory: 40**

CA: 10

Instructions for the Paper Setters:

The students are required to present a seminar on a topic of relevance related to recent research in life sciences. It emphasizes hands-on learning through group discussions, presentations, and research activities.

Master of Science (Zoology) Semester–II

Session 2024-26

Course Title: Practical–III (Functional Organizations of Animals-II)

Course Code: MZOP-2486

(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understand the comparative anatomy through demonstration.
- CO2. Understand the comparative physiology of sense organs, muscles, endocrine system through ICT based videos, presentations and charts.
- CO3. Compare reproductive systems of various invertebrates.
- CO4. Understand the comparative physiology reproductive system through ICT based videos, presentations and charts.

Master of Science (Zoology) Semester–II

Session 2024-26

Course Title: Practical–III (Functional Organizations of Animals-II)

Course Code: MZOP-2486

(Practical)

Examination Time: 3 hrs **Maximum marks: 50**

L-T-P: 0-0-2 **Practical: 40**

CA: 10

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. Study of permanent slides

Skin of fish, frog, lizard, bird and mammal
Setae of earthworm
Spicules of Sponges and Herdmania
Internal ear of fish
Tentorium of grasshopper
Muscle fibers, cartilage and bone
Endocrine glands of vertebrates

2. Appendicular skeleton

3. Study the following with the help of charts/models/videos/permanent slides

Appendages of Prawn
Wing venation, coupling and types of wings of insects
Comparative anatomy of nervous system in Earthworm, Cockroach, Pila, Sepia, Fishes, Bird and Mammal
Eye muscles of fish/mammal
Modification of antennae of arthropods

Note: The above mentioned practicals are in accordance with the guidelines of UGC. Practicals involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Practical–IV (Evolution and Applied Zoology-I)
Course Code: MZOP-2487
(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Calculate regression, correlation and variance of gene frequency and genetic equilibrium and understand the principle of natural selection as a process related to evolution.
- CO2. Comparison of skeletons for listing evolutionary trends and comparison of molluscan shells to depict polyphyletic origin.
- CO3. Compare homologous and analogous structures.
- CO4. Prepare of Phylogenetic tree using some Priory weight characters with the help of 8 – 10 animals from various categories.

Master of Science (Zoology) Semester–II
Session 2024-26
Course Title: Practical–IV (Evolution and Applied Zoology-I)
Course Code: MZOP-2487
(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-2 **Practical: 40**
CA: 10

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. Calculations for regression, correlation and variance of gene frequency and genetic equilibrium (taking pea pods).
2. Examination of the principle of natural selection as a process related to evolution in a population (using coloured marbles /beads).
3. Comparison of skeletons for listing evolutionary trends.
4. Comparison of molluscan shells to depict polyphyletic origin.
5. Comparison of homologous and analogous structures (e.g. insect antenna, legs, limbs of vertebrate etc.).
6. Demonstration of kinds of mimicry in various groups of animals.
7. Mapping of geographic distribution of some birds, insects, fish etc.
8. Study of various evolutionary phenomenon using slides/photographs.
9. Study of fossils.
10. Preparation of Phylogenetic tree using some Priory weight characters with the help of 8 – 10 animals from various categories.
11. Visit to apiary/vermicomposting unit/ sericulture unit/ Prawn Farm and preparation of report.

Note: The above-mentioned practical are in accordance with the guidelines of UGC. Practical involving animal material will be conducted using models/charts/e-resources. Minor modifications in the curriculum are allowed subject to availability of resources.

ANNEXURE G

FACULTY OF LIFE SCIENCES

Syllabus

Master of Science (Zoology)

(Under Credit Based Continuous Evaluation Grading System)

(SEMESTER: III-IV)

Session: 2024-25

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

Master of Science (Zoology)

Session 2024-25

Program Specific Outcomes

1. Understand and analyse the ecological and evolutionary principles such as evidences of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life and their economic importance. they will be able to use specific examples to explicit how descent with modification has shaped animal morphology, physiology, life history and behaviour.
2. Understanding of fundamental concepts of various branches of zoology and efficiency in computational tools, numerical methods relevant to zoology.
3. Acquire proficiency in experimental techniques, data analysis and drawing conclusions in zoology.
4. Ability to critically evaluate scientific literature, synthesize information from multiple sources and apply scientific reasoning to solve problems in zoology and related fields.
5. Demonstrate knowledge to acquire, articulate, retain and employ practical skills relevant to fundamentals of computer, molecular techniques and statistical tools.
6. Students will be able to apply their knowledge of zoology to address real world challenges in areas such as animal ecology, wildlife management, biotechnology, applied zoology and taxonomy.
7. Demonstrate adaptability to emerging technologies and tools relevant to the field of zoology and enhance communication skills for effectively presenting scientific findings and collaborating within interdisciplinary teams.
8. Understand how the chemistry and structure of the major biological macromolecules, including nucleic acids to know their biological properties and determine relationship of variations in phenotypic expression of genome and their genome wide interactions with other organisms.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Session-2024-25

Master of Science (Zoology) Semester-III

Course Code	Course Name	Course Type	Hours Per Week	Credits	Total Credits	Marks				Examination time (in hours)
						Ext.				
				L-T-P		L	P	CA	Total	
MZOL-3481	Research Techniques and Methodology	C	4	4-0-0	4	80	-	20	100	3
MZOL-3482	Developmental Biology-I	C	4	4-0-0	4	80	-	20	100	3
MZOL-3483	General Biochemistry	C	4	4-0-0	4	80	-	20	100	3
MZOL-3484	Applied Zoology-II (Vertebrates)	C	4	4-0-0	4	80	-	20	100	3
MZOP-3485	Practical –V (Research Techniques and Applied Zoology-II)	C	6	0-0-3	3	-	40	10	50	3
MZOP-3486	Practical VI (Developmental Biology and Biochemistry)	C	6	0-0-3	3	-	40	10	50	3
Students can opt any one of the following interdisciplinary compulsory courses. The ID Course opted in SEM-I cannot be opted in SEM – III.		**IDE**			4	80		20	100	
			Total		**22**				**500**	

IDEC - 3101 IDEM -3362 IDEH -3313 IDEI - 3124 IDEW-3275	• Communication Skills • Basic Music (Vocal) • Human Rights and Constitutional Duties • Basics of Computer Applications • Indian heritage: Contribution to the World

IDE – Inter Disciplinary Elective/Optional Course

*** Credits/Grade points of these courses will not be included in the SGPA/CGPA of semester.**

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Session-2024-25

Master of Science (Zoology) Semester-IV

Course Code	Course Name	Course Type	Hours Per Week	Credit	Total Credit	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MZOL-4481	Animal Behaviour and Wildlife Conservation	C	4	4-0-0	4	80	-	20	100	3
MZOL-4482	Molecular Genetics	C	4	4-0-0	4	80	-	20	100	3
MZOL-4483	Concepts of Immunology	C	4	4-0-0	4	80	-	20	100	3
MZOL-4484	Developmental Biology- II	C	4	4-0-0	4	80	-	20	100	3
MZOL-4485	Biosystematics	C	4	4-0-0	4	80	-	20	100	3
MZOP-4486	Practical–VII (Animal Behaviour and Wildlife Conservation)	C	6	0-0-3	3	-	40	10	50	3
MZOP-4487	Practical–VIII (Genetics and Biosystematics)	C	6	0-0-3	3	-	40	10	50	3
MZOD-4488	Project	C	6	0-0-3	3	-	40	10	50	3
Total					**29**				**650**	

Master of Science Zoology (Semester–III)

Session 2024-25

Course Title: Research Techniques and Methodology

Course Code: MZOL-3481

(Theory)

COURSE OUTCOMES

After passing this course the student will be able:

- CO1. To develop detailed understanding of centrifugation and chromatography.
- CO2. understand various spectroscopic techniques.
- CO3. understand various types of electrophoretic techniques.
- CO4. To make the students aware about Radioisotopic techniques.

Master of Science Zoology (Semester–III)

Session 2024-25

Course Title: Research Techniques and Methodology

Course Code: MZOL-3481

(Theory)

Examination Time: 3 hr **Maximum marks: 100**

L-T-P: 4-0-0 **Theory: 80**

CA: 20

Instructions for the Paper Setter:

Eight questions of equal marks (16 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

Centrifugation

Basic principles

Theory and applications of preparative and analytical centrifugation

Rotor types

Sedimentation co-efficient

Care of rotors

Chromatography

Theory, principle and application of column, paper, thin layer, ion-exchange, affinity chromatography, GLC and HPLC

Unit–II

Spectroscopy

Principle and applications of UV/Visible spectroscopy, NMR, ESR and Mass spectroscopy Luminometry, Atomic spectroscopy

Microscopy

Scanning and Transmission Electron microscopy

Fluorescence Resonance Energy Transfer microscopy

Techniques

X-ray crystallography

Patch clamp

Unit–III

Electrophoresis
General principles
Support media
Electrophoresis of proteins
Electrophoresis of nucleic acids
Capillary electrophoresis
Microchip electrophoresis

Unit–IV

Radioisotopic Techniques

Basic concepts of radioisotope
Theory and applications of Geiger-Muller tube
Solid and Liquid Scintillation
Safety rules for radioisotopic studies
Biological applications

Suggested Reading Material:

- Slater, R.J. (1990). Radioisotopes in Biology- A Practical Approach, Oxford University Press, NY.
- Wilson, K and Goulding, K.H. (1991). Biologist's Guide to Principles and Techniques of PracticalBiochemistry. 3rd., Edward Arnold, London.
- Sawhney, S.K. and Singh, R. (2001). Introductory Practical Biochemistry, Narosa Publishing House, NewDelhi.
- Tinoco Kenneth Saur and J.C. Wang. Physical Chemistry: Principles and Applications in Biological Sciences,3rd edition.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Developmental Biology – I
Course Code: MZOL-3482
(Theory)

COURSE OUTCOMES

After passing this course the student will be able:

- CO1. To develop detailed understanding of essential events of developmental biology through proper explanation of gametogenesis, fertilization, as part of early embryonic development and to impart knowledge regarding in-vitro fertilization.
- CO2. To impart knowledge regarding basic concepts of parthenogenesis, cleavage and gastrulation to the students.
- CO3. To provide adequate explanation to the students regarding cell commitment, specification and determination.
- CO4. To make the students aware about genetic control of development, induction and regulation of developmental events.

Master of Science Zoology (Semester–III)
Session 2024-25

Course Title: Developmental Biology – I
Course Code: MZOL-3482
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory marks: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Gametogenesis
Spermatogenesis
Oogenesis
Vitellogenesis
Fertilization
Types of Fertilization (External and Internal)
Acrosome reaction & capacitation of sperm
Fusion of the egg-sperm membranes and genetic material during fertilization
The fast and slow block to polyspermy
The cortical granule reaction, Activation of egg metabolism
In vitro fertilization and embryo transplantation

Unit–II

Natural and artificial parthenogenesisCleavage
Cleavage and its patterns
Gastrulation
Gastrulation and morphogenetic movements
Morphogenesis of germ layers
Morphogenetic field

Unit–III

Cell commitment and beginning of new organism
Commitment of Cells during early development
Various levels of Commitment
Specification and its types (autonomous, conditional, Syncytial)
Determination of early embryonic induction
Transdetermination

Unit -IV

Genetic Control of Development and Induction
Regulation of early development

Mechanisms of differential gene expression
Differential RNA processing Control at
the level of translationPost translational
regulation of gene expression

Suggested Reading Material:-

- Balinsky, B.I. (1981). An Introduction to Embryology, Saunders, Philadelphia.
- Bellairs, R. (1971). Development Processes in Higher Vertebrates, University of Miami Press, Miami.
- Berrill. N.J. (1971): Developmental Biology. McGraw Hill, New Delhi.
- Dawnpart, Developmental Biology.
- Gilbert, F. (1985,95&2000): Developmental Biology, Sinaur.
- Goel, S.C. (1984): Principles and Animal Developmental Biology, Himalaya, Bombay.
- Grant, P. (1978): Biology of Developing System.
- Spratt, N.T.Jn. (1971): Developmental Biology, Wordsworth, Belmont, Co.
- Waddigton CH. (1966): Principles of Development and Differentiation. MacMillan, New York.
- Miller, W.A. (1997). Developmental Biology Springer Verlag, New York.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: General Biochemistry
Course Code: MZOL-3483
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Explain Enzyme kinetics
- CO2. Describe Glycolysis.
- CO3. Reactions and regulation of citric acid cycle
- CO4. Oxidation of fatty acids and amino acids.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: General Biochemistry
Course Code: MZOL-3483
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Enzymes
Enzyme substrate complex
Active sites
Energy mechanics of enzymatic reactions
Michaelis-Menton kinetics
Vmax and Km and their significance
Modifiers of Enzyme activity
Regulatory enzymes

Unit–II

Glycolysis
Fates of glycolysis
Fates of pyruvate under aerobic and anaerobic conditions
Gluconeogenesis and the carbohydrate catabolism
Pentose phosphate pathway

Unit–III

Citric acid cycle
Oxidation of pyruvate
Production of acetate
Reactions of citric acid cycle
Regulation of citric acid cycle
Glyoxylate cycle

Unit–IV

Oxidation of fatty acids and amino acids
Metabolism and transport of fats
Oxidation of fatty acid

Generation reactions and metabolism of amino acids

Oxidative phosphorylation

Electron transport reactions in mitochondria

Shuttle system in mitochondria Regulation of oxidative phosphorylation

Suggested Reading Material:

- Lehninger A.D. Nelson D.L. & Cox M.M. (1993) & (2000), Principles of Biochemistry, 2nd and 3rd ed. WorthPublishers, New York.
- Lehninger, A (2000). Principles of Biochemistry. 3rd Edition.
- Fischer, J. and Arriold, J.R.P. (2001). Instant notes in Chemistry for Biologists Viva Books Pvt. Ltd.
- Harper, H.A. (2000): Harper's Biochemistry 25th ed.
- Morris, H. Best, L.R., Pattison, S., Arerna, S. (2001). Introduction to General Organic Biochemistry. 7th Ed.Wadsworth Group.
- Sheehon, D (2000). Physical Biochemistry: Principles and Applications – John Wiley & Sons Ltd., England.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Applied Zoology – II (Vertebrates) (Theory)
Course Code: MZOL-3484

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1.Learn skill development for small scale industry such as fisheries, piggeries.
- CO2. Gain knowledge about processing and use of fur and wool industry.
- CO3.Understandselection and products of dairy animals and processing of leather industry.
- CO4. Understanding of Pharmaceutical products from animals.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Applied Zoology – II (Vertebrates) (Theory)
Course Code: MZOL-3484

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory marks: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Pisciculture
Economically important fresh water and marine fishes
Fish Farming Technologies
Factors affecting fish culture
Induced breeding methods
Products and by products from Pisciculture
Poultry
Breeds of poultry birds
Egg structure and quality, nutritive values, abnormalities in eggs, factors affecting size and egg processing
Broilers, meat processing
Poultry Rearing / Farming
Housing and equipment
Poultry diseases
Poultry products and by products

Unit–II

Fur Industry
Fur producing animals
Fur farming, dressing, processing and dyeing
Fur industry in India
Wool Industry
Animals of wool industry
Types, structure and physicochemical properties of wool
Processing of wool: shearing, clearing, drying, bleaching, dyeing, spinning and twisting

Unit–III

Dairy Farming

Milching animals, Breeds, Housing, raising and Tools of management
Artificial insemination and IVF for improvement of stock
Milk composition and dairy products

Leather Industry

Animals of leather industry
Processing of skin: flaying, Curing and tanning
Enemies of skin industry

Unit–IV

Piggery

Characteristics of swine and important breeds
Breed selection, management and housing
Products (Pork, Bristles, Lard, Sausages) and by products
Diseases of Pigs

Other Utilities of Animals

Pharmaceuticals from animals (in brief)
Use of animals in vaccine production

Suggested Reading Material:

- Banarjee, G.C. (1991), Text book of Animal Husbandry. Oxford and IBH Pub, New Delhi.
- Jawal, P.L. (1977), Handbook of Animal Husbandry, I. C. A. R., Pub. New Delhi.
- Jhingaran, V.G. (1991), Fish and Fisheries of India, Hindustan Pub. Co. India.
- Mustafa, S. (1990), Applied and Industrial Zoology, Rastogi publications, Meerut.
- Sarkar, K. T. (1991), Theory and Practice of Leather manufacture. The Author, Madras.
- Shami, Q. J. and Bhatnagar, S. (2002) Applied Fisheries. Agrobios India.
- Shukla, G. S. &Upadhaya, V. B. (1991-92), Economic Zoology, Rastogi Publications, Meerut.
- Toor, H. S. and Kaur, K. (1996), Fish Culture Manual. PAU, Ludhiana.
- Yadav, M. (2003) Economic Zoology, Discovery Publication House, New Delhi.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Practical V (Research Techniques and Applied Zoology-II)
Course Code: MZOP-3485
(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understand centrifugation techniques.
- CO2. Gain practical knowledge about chromatographic techniques.
- CO3. Estimate protein content, DNA/RNA with the help of spectroscopic techniques.
- CO4. Understand various electrophoretic techniques.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Practical V (Research Techniques and Applied Zoology-II)
Course Code: MZOP-3485
(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-3 **Practical: 40**
CA: 10

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.

Centrifugation
-Sedimentation using Swing out Rotor and Angle Rotor Differential centrifugation

Chromatography Techniques: (for separation of macromolecules)
Paper chromatography Thin layer chromatography
Gel permeation chromatography

Spectrophotometric Techniques
Preparation of standard curve of BSA, DNA, RNA
Measurement of transmission of light through different solutions or substances at different wavelengths of light.
Estimation of DNA/RNA

Electrophoresis Techniques
-Preparation of native polyacrylamide gel.
-Gel separation of proteins by native PAGE.
-Preparation of SDS-polyacrylamide gels
-Separation of proteins by SDS-PAGE.
-Direct and Indirect ELISA

Note: Visit to a fish farm/poultry form/pig farm/sheep or goat farm/meat processing industry/leather industry/wool industry and preparation of report.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Practical VI (Developmental Biology and Biochemistry)
Course Code: MZOP-3486
(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Study different larval forms across animal kingdom and developmental stages of chick.
- CO2. Study developmental stages of frog and metamorphosis.
- CO3. Study spermatogenesis, oogenesis, testis and ovaries.
- CO4. Do quantitative analysis of proteins, lipids and carbohydrates.

Master of Science Zoology (Semester–III)
Session 2024-25
Course Title: Practical VI (Developmental Biology and Biochemistry)
Course Code: MZOP-3486
(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-3 **Practical: 40**
CA: 10

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. Study of different larval forms across the animal Kingdom using charts/models/videos.
2. To study developmental stages of chick through slides/charts.
3. To study developmental stages of frog through slides/charts
4. Metamorphosis through charts/audio video means in frog and insect.
5. Study of spermatogenesis and oogenesis through permanent slides
6. Study of testis and ovary through permanent slides.
7. Quantitative analysis of proteins by Lowry/ Bradford method.
8. Estimation of Lipids
9. Estimation of Carbohydrates

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Animal Behaviour and Wildlife Conservation
Course Code: MZOL-4481
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Demonstrate knowledge of key concepts in animal behavior, its patterns, and analysis. It will also enable the students to understand the proximate controls of behavior including the role of hormones, the animal's genotype and the animal's environment in the development of behavior
- CO2. Adaptive significance of behavior, emphasizing social behavior, territoriality, sexual selection, parental care and mating systems
- CO3. Understanding and awareness for wildlife conservation. To impart knowledge regarding conservation of threatened animal species.
- CO4. Understand the significance of various wildlife projects for conservation of threatened species and the status of wildlife in Punjab.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Animal Behaviour and Wildlife Conservation
Course Code: MZOL-4481
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:

Eight questions of equal marks (16 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

Introduction
Ethology as a branch of biology
Animal Psychology – classification of behavioural patterns
Analysis of behaviour (ethogram)
Neural and Hormonal control of Behaviour
Genetic and environmental components in the development of behaviour
Communication
Chemical, Visual tactile and Audio communication
Functions of communication
Song specificity in birds
Host-parasite relations

Unit–II

Social Behaviour
Aggregations-schooling in fishes, Flocking in birds, Herding in mammals
Advantages and disadvantages of living in groups
Group selection, kin selection, altruism, reciprocal altruism, inclusive fitness
Social organization in insects and primates
Reproductive Behaviour
Mating and Courtship behaviour
Sexual selection
Parental care
Learning and Memory
Conditioning, Habituation, Associative learning, Reasoning and Cognitiveskills

Unit–III

Biodiversity as a resource and causes of its depletion
Patterns and process of biodiversity
Losses and threats to biodiversity
Eco-sensitive Zones,
Wetlands of National Importance
Methods of studying wildlife
Biological consequences of habitat fragmentation, Edge effects

Wildlife conservation measures
Role of zoos, parks and sanctuaries for conservation of some wild animals
Conservation outside protected areas
Conservation breeding programs and their importance
Conservation and sustainable development
Significance of ecological restoration in conservation

Laws, legislation and statuary bodies for protecting wildlife
Forest (Conservation) Act; Wildlife (Protection) Act; Environment (Protection) Act
National Conservation Authorities (National Biodiversity Authority and National Tiger Conservation Authority),
International Conservations viz., RAMSAR Convention,
Convention on Biological Diversity,
Convention on migratory Species
Red data book
IUCN list (endangered, vulnerable, rare, threatened and intermediate species)

Unit–IV

Status of Wildlife in Punjab
National and state animals of India
Forestry and Forest Management in India
Special projects for Endangered and Threatened Species and concerns
Project Tiger
Project Hangul
Project Rhino
Project Elephant
Project Snow Leopard
Gir Lion Sanctuary Project
Project Great Indian Bustard
Ecology & Conservation of the Himalayan Musk deer
The Manipur Brow antlered deer

Suggested Reading Material:

- Aggarwal, (2000), Biodiversity.
- Aggarwal, (2000), Wildlife of India.
- Alcock, J. (1998), Animal behaviour, An evolutionary approach Sinauer Assoc., Sunderland, Mass, USA.

- Ali, S. (1971), The Books of Indian Birds, Bombay Natural History Society, Bombay.
- Burton, L. D. (2003), Fish and Wildlife: Principles of Zoology and Ecology. Delmar Thompson Learning Pb.
- Dasmann, R. F., (1982), Wildlife Biology, Wiley Eastern, New Delhi.
- Drickamer, L. C. and Vessey, S. H. (1986), Animal Behaviour- Concepts, Processes and Methods. (2nd ed.), Wordsworth Publ. Co., California.
- Fulbright, Timothy, E. and Hewitt, D. G. (2008). Wildlife Science: Linking Ecological Theory and Management Applications. CRC Press, Taylor and Francis : BocaRaton, F L.
- Giles, R. H. (1984), Wildlife Management Techniques, Natraj Publishers, Dehradun.
- Gopal, R. (1992), Fundamental of Wildlife management Justice Home Allahabad.
- Goodenough, J., McGurie and Wallace, R. A. (2001), Perspective on animal behaviour. John Wiley & Sons, Inc. New York.
- Hosetti, B. B. (1997), Concepts in Wildlife Management, Chawla Press, Delhi.
- Huntingford F. (1984), The study of animal Behaviour, Chapman and Hall, London.
- Manning, A. and Dawkins, M. S. (1992 & 1998), An Introduction to Animal Behaviour, 4th ed. (Cambridge low price editions). Cambridge University Press, Cambridge.
- Manning, A. (1979), An Introduction to Animal Behaviour, 3rd Edition . The English Language Book Society and Edward Arnold Publishers Ltd.
- McFarland, D. (1985 & 1999), Animal Behaviour. Pitman Publishing Ltd. London.
- Majupuria T. C. (1990), Wildlife Wealth of India (Resources and Management), ISBN, Tecpress Services, Thailand.
- Moulton, M. P. and Sanderson, J. (1997), Wildlife issues in a changing world. St. Luice Press Florida.
- Negi, S. S. (1995), Hand Book of National Park, Sanctuaries and Biosphere Reservoirs in India, Indus publishing Co., New Delhi
- Prater, S. H. (1980), The Book of Indian Animals, Bombay Natural History Society, Bombay.
- Saharia, V. P. (1982), Wildlife in India, Natraj Publisher, Dehradun. Samways, M. J. (1994), Insect Conservation Biology, Chapman and Hall, New York.
- Sharma, B. D. (1994), High Altitude Wildlife of India, Oxford IBH, New Delhi.
- Sharma, B.D. (1999), Indian Wild Life Resources Ecology and Development . Daya

Publishing House, Delhi.

- Sharma, B.D. (2002), Man environment and wildlife animal. IBH Publishing Co., Pvt . Ltd. New Delhi.
- Teague, R. D. (1987), A manual of Wildlife Conservation, Natraj Publishers, Dehradun.
- Tikadar, B. K. (1988), Threatened Animals of India, Publications of Zoological Survey of India, Calcutta.
- Tirvedi, P.R. and Singh, U. K. (1996), Environmental Laws of Wildlife. Sodhi,
- Navjot S., and Paul R. Ehrlich eds. Conservation Biology for all. Oxford University Press, 2010.
- Sutherland, William J., ed. Ecological census techniques: a handbook. Cambridge University Press, 2006.
- Protected Areas Network (http://www.wiienvis.nic.in/Database/Protected_Areas_854.aspx)
- IUCN Red List of Threatened Species (https://www.iucn.org/resources/conservationtools/iucn-red-list-threatened-species).
- Indian Mammals, A Field Guide by Vivek Memon.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Molecular Genetics
Course Code: MZOL-4482
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Describe DNA replication and DNA repair.
- CO2. Describe transcription and Post-transcriptional modifications in RNA.
- CO3. Explain translation in prokaryotes and eukaryotes
- CO4. Understand Genetics of Cancer.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Molecular Genetics (Theory)
Course Code: MZOL-4482

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

DNA replication and Repair Replication
Mechanism of Prokaryotic and Eukaryotic DNA replication Enzymes and accessory proteins involved in DNA replication
Repair
Overview of DNA Repair
DNA Mismatch Repair system
General Excision Repair system
Specialised DNA Repair Mechanisms
SOS Error Prone Repair in Bacteria
Repair in Eukaryotes

Unit - II

Transcription
Prokaryotic Transcription
Eukaryotic Transcription
RNA Polymerase
Post-transcriptional Modifications in RNA
5' – Cap formation
Transcription termination
3'- end processing and polyadenylation
Splicing, Editing, mRNA stability
Mechanism of transcription regulation
Transcriptional and post transcriptional gene silencing

Unit - III

Translation
Genetic code
Prokaryotic and Eukaryotic translation
The translational machinery

Mechanism of initiation, elongation and termination
Co- and post translational modification of proteins
Regulation of translation

Unit - IV

Genetics of Cancer
Development and Causes of Cancer
Oncogenes
Tumor Suppressor Genes
Molecular Approaches to cancer treatment

Suggested Reading Material:

- Ayala, F.J. & Kiger, Jr. J.A. (1980) Modern Genetics. The Benjamin Cummings Publishing Co. Inc.
- Brown T.A. (1992). Genetics- A Molecular Approach, 2nd ed. Van Nostrand Rainhold (International).
- De-Robertis, F.D.P. and De-Robertis Jr., E.M.E. (1987). Essentials of Cell and Molecular Biology, Saunders, Philadelphia.
- Gardener, E.J., Simmons, M.T.J. & Sunstad, D.P. (1999) : Principles of Genetics,8th ed. John Wiley & Sons, New York.
- Miglani, G.S. (2000). Basic Genetics Narosa Publishing House, New Delhi.
- Weaver, R.F. and Hedrick, P.W. (1992). Genetics Wm. C. Brown Publishers Dubuque.
- Zubay. U.G. (1987), Genetics. The Cummings Publishing Co., Inc.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Concepts of Immunology
Course Code: MZOL-4483
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity.
- CO2. Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses and understand the cellular as well as molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- CO3. Understand the molecular basis of complex, cellular processes involved in inflammation and immunity, in states of health and disease.
- CO4. Understand immunodiagnostics techniques.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Concepts of Immunology
Course Code: MZOL-4483
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Introduction
Types of immunity-innate and adaptive Features of immune response-memory Specificity and recognition of self and non-self
Terminology and approaches to the study of immune system

Cells and Organs of the immune system:
Heterogeneity of lymphoid cells Primary and secondary lymphoid organs
Mucosa Associated Lymphoid Tissue (MALT), GALT, CALT
Lymphocytes traffic

Unit–II

Humoral Immunity
Ag-Ab interaction Affinity and avidity
High and low affinity anti-bodies
Classes and structure of immunoglobulins
B-cell generation, activation and proliferation
Complement fixing antibodies and complement cascade

Cell Mediated Immunity
Structure of MHC
Antigen processing and presentationT-cell receptor- role and structure
T-cell maturation, activation and differentiation

Unit - III

Immunological Disorders
Types of Hypersensitivity reactions
Mechanism of Hypersensitivity reactions
Autoimmune disorders, their underlying molecular mechanism
Immunodeficiency disorders
AIDS

Unit–IV

Antigen-antibody interactions
Immunodiagnostic Procedures
Various types of Immunodiffusion and immunoelectrophoretic procedures
Immunoblot
ELISA
RIA
Agglutination of pathogenic bacteria
Haemagglutination and inhibition

Suggested Reading Material:

- Kuby, J., Immunology W. H. Freeman and Company, New York, (1992).
- Roitt, I. M. Brostoff, J and Male, D., Immunology, 2nd edition, Gover Medical Publishing, New York. (1989).
- Roitt, I. M., Essential Immunology, 6th edition, Blackwell Scientific Publications, Oxford. (1988).
- Paul, W.E., Fundamental Immunology, 2nd edition, Raven Press, New York. (1989).
- Playfair, J.H.L.: Immunology at a glance, 5th edition, Blackwell Scientific Publications, Oxford. (1992).
- Paul, W.E.: Immunology; recognition and response. W.H. Freeman, New York. (1991).

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Developmental Biology-II
Course Code: MZOL-4484
(Theory)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Impart knowledge regarding cell, cell communication, induction and competence.
- CO2. Develop detailed understanding of essential events of organogenesis in developmental biology.
- CO3. Explain the adequate explanation to the students regarding concepts of organizer, axis specification and influence of extrinsic factors on the genetic control.
- CO4. Gain adequate information regarding metamorphosis, regeneration and growth.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Developmental Biology-II
Course Code: MZOL-4484
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Cell -Cell Communication in development
Role of adhesion molecules
Induction and competence of cells during development
Vulval formation
Vertebrate lens regeneration
The extracellular matrix as a source of developmental signals
The epithelial Mesenchymal transition

Unit–II

Organogenesis
Ectodermal derivatives
Formation of neural tube and brain
Differentiation of neurons in the brain
Tissue architecture of the central nervous system
Formation of the eye
Mesodermal derivatives
Formation of somites Osteogenesis
Formation of dorsal aorta
Formation of Urogenital system
Development of heart and blood vessels
Endodermal derivatives
The pharynx
The digestive tube and its derivatives
The respiratory tube

Unit–III

Organizer and axis specification
Axis Specification: Invertebrates (Drosophilla) and Vertebrates (Amphibian/Zebra Fish)
Concept of Organizer and its Role

Nucleus and cytoplasmic interactions during developmentInfluence of extrinsic factors on genetic control

UNIT-IV

Metamorphosis, Regeneration and Growth
Metamorphosis
Metamorphosis in insects
Metamorphosis in amphibians
Regeneration
Stem cell mediated Regeneration in Flatworm Regeneration in Hydra
Regeneration in Salamander limbs
Compensatory regeneration of mammalian liver
Concept of growth at cellular, subcellular and organ level

Suggested Reading Material:-

- Balinsky, B.I. (1981). An Introduction to Embryology, Saunders, Philadelphia.
- Bellairs, R. (1971).Development Processing Higher Vertebrates, University of MiamiPress, Miami.
- Berrill. N.J. (1971): Developmental Biology. McGraw Hill, New Delhi.
- Dawnpart, Developmental Biology.
- Gilbert, F. (1985,95 & 2000): Developmental Biology, Sinaur.
- Goel, S.C. (1984): Principles and Animal Developmental Biology, Himalaya, Bombay.
- Grant, P. (1978): Biology of Developing System.
- Spratt, N.T. Jn. (1971): Developmental Biology, Wordsworth, Belmont, Co.
- Waddigton CH. (1966): Principles of Development and Differentiation. MacMillan,NewYork.
- Miller, W.A. (1997). Developmental Biology Springer Verlag, New York.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Biosystematics
Course Code: MZOL-4485
(Theory)

COURSE OUTCOMES

After completion of course the student will be able to:

- CO1. evaluate the taxonomic characters and apply this for the identification and classification of living things.
- CO2. Apply the various taxonomic procedures for collection, preservation and identification of living organisms.
- CO3. Knowledge of different types of publications
- CO4. Knowledge about major and minor phyla

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Biosystematics
Course Code: MZOL-4485
(Theory)

Examination Time: 3 hrs **Maximum marks: 100**
L-T-P: 4-0-0 **Theory marks: 80**
CA: 20

Instructions for the Paper Setter:
Eight questions of equal marks (16 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

Introduction
Terms / Definitions
History/ Development of theories, kinds of classificationImportance of Biosystematics
Material basis of BiosystematicsDifferent attributes or evidences
Character kinds
Character weighing
New aspects of Biosystematics
Cytotaxonomy
Chemotaxonomy
Molecular taxonomy

Unit–II

Taxonomic Procedures
Taxonomic collections, Preservation, Identification
Taxonomic keys (Different kind, salient features, merits and demerits)
International Code of Zoology/Nomenclature
Nomenclature Principles, important rules, their interpretation andapplication in scientific nomenclature

Unit–III

Taxonomic Publications
Scientific publications
Systematic publications
Contents of publications

Taxonomic Hierarchy

Species category and various concepts of species
Hierarchy of categories
Lower and higher categories
Subspecies and other sub specific categories
Decision at species and sub species level

Unit–IV

History of kingdom systems (resume of Whittaker's system and otherrecent systems of classification)

An outline of classification of kingdom Animalia
Salient features of minor phyla.

Suggested Reading Material:

- Gote, H.E. (1982), Animal Taxonomy, Edward Arnold.
- Jaffery, C. (1973), Biological Nomenclature, Edward Arnold.
- Kapoor, V.C. (1987), Theory and Practice of Animal Taxonomy, IPH Pb. NewDelhi.
- Mayer, E. (1969), Principle of Systematic Zoology, McGraw Hill Book Co. London.
- Mayer, E. &Aschhok (1991), Principles of Systematics, McGraw Hill Book Co.London.
- Minell, A. (1993), Biological Systematics, The State of Art. Chapman & Hall, London.
- Quicke, D.L.J, (1996), Principles & Techniques of Contemporary Taxonomy, BlackyAcademic & Professional, London, New York, Madras.
- Kitching, I.J., Forey, P.L. Humpheries, C.J. & William, D. 1998. Cladistics: Theoryand Practice of Parsimony Analysis, Oxford University Press.
- Sebuh, Randall T. 2000, Biological Systematics: Principles & Applications Cornell University Press 256 pp.
- Winston, J. 1999. Describing Species Practical Taxonomic Procedure of Biologists. Columbia University Press, Lincoln, R.J. Dictionary of Ecology, Evolution and Systematics.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Practical VII Animal Behaviour and Wildlife Conservation
Course Code: MZOP-4486
(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. study influence of temperature and food preference
- CO2.understand Geotaxis and humidity preference.
- CO3. study phototaxis in invertebrates.
- CO4. Understand different behavior patterns in animals.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Practical VII Animal Behaviour and Wildlife Conservation
Course Code: MZOP-4486
(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-3 **Practical: 40**
CA: 10

1. To study the food preference in animals.

2. To investigate the locomotion withdrawal and habituation behaviors.

3. To study the latent and operant learning.

4. To study the thigmotaxis response.

5. To study chemical communication in ants.

6. To study the phenomenon of geotaxis

7. To study the phototaxis to point source and different colours of light

8. To study grooming behaviour

9. To study web spinning habits in spiders.

10. Use of videos to study the

a) Tarsal response in butterfly/housefly.

b) Equilibrium study on housefly.

c) Effect of temperature on opercular movement in fish.

11. To study animal behaviour patterns using photographs.

12. To mark the following on map

a. Biodiversity hotspots in India

b. National parks in India.

13. Assignment on Wildlife project.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Practical VIII Genetics and Biosystematics
Course Code: MZOP-4487
(Practical)

COURSE OUTCOMES

After passing this course the student will be able to:

- CO1. Understanding of pedigree analysis and preparation of family charts.
- CO2. Knowledge of isolation of DNA from human blood and buccal cells.
- CO3. Understanding of cell division.
- CO4. Understanding of inheritance of morphogenetic human characters and knowledge of collection, preservation and nomenclature of animals.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Practical VIII Genetics and Biosystematics
Course Code: MZOP-4487
(Practical)

Examination Time: 3 hrs **Maximum marks: 50**
L-T-P: 0-0-3 **Practical: 40**
CA: 10

1. To prepare and study the karyotype of human cell from meta phase pictures.
2. To study the pedigree analysis of a family.
3. To study blood groups in human beings.
4. Demonstration of Barr body in the oral epithelium of human beings.
5. To study different stages of mitosis in root tips of *Alliumcepa.*
6. To study permanent slides of:-
    a. Mitosis in bone marrow cells of rat.
    b. Stages of meiosis in testis of rat/grasshopper/*Allium cepa.*
    c. Polytene chromosomes in third in star larvae of *Zaprionus paravittiger*.
7. To study dermatoglyphics with palms of hands and fingertips.
8. To study inheritance of morphogenetic human characters.
9. Isolation of DNA from plant tissues.
10. Numericals on Mendelian laws of inheritance and linkage.
11. Serum extraction from blood.
12. ELISA & RIA, Rocket Immuno-electrophoresis.
13. Demonstration of various kinds of equipment required for collection and preservation of animals.
14. Videos of Methods of collection and preservation.
15. Kinds of keys and their use at higher and lower category levels.

Master of Science Zoology (Semester–IV)
Session 2024-25
Course Title: Project
Course Code: MZOP-4488

COURSE OUTCOMES

After completion of this course the student will be able to:

- CO1. Express their innovative ideas and creativity on anyscientific phenomenon & develop interest in research aptitude.
- CO2. Learn to study literature.
- CO3. Explore field work and research work.
- CO4. Learn how to design an experiment and various research strategies.

Master of Science Zoology (Semester–IV)

Session 2024-25

Course Title: Project

Course Code: MZOP-4488

Examination Time: 3 Hrs **Maximum marks: 50**
L-T-P: 0-0-3 **Practical: 40**
CA: 10

Students will Students can opt for any one from the following and will submit a detail reportafter successful completion:

(a) Review on a research topic

(b) Small Research Project

(c) Hands on Training in any Industry/Research Lab

Marks will be given on the basis of presentation and viva delivered by student.

ANNEXURE H

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO-YEAR DEGREE PROGRAMME

(Under Credit Based Continuous Evaluation Grading System) (CBCEGS)

Scheme for Master of Science (Chemistry)

Session 2024-2025

Master of Science (Chemistry) Semester-II

Course Code	Course Name	Course Type	Hours Per Week	Credits	Total Credits	Marks				Examination time (in hours)
						Ext.		CA	Total	
				L-T-P		L	P			
MCHL-2056	Biology for Chemists	C	2	2-0-0	2	40	-	10	50	3

M. Sc. Chemistry (Semester-II) (Session-2024-25)
BIOLOGY FOR CHEMISTS
COURSE CODE: MCHL-2056
(For Non-Medical Students)
(Theory)

Course Outcomes

After passing this course the student will be able to:

- CO1. Gain knowledge about the biomolecules and cell structure.
- CO2. Understand different types of tissues.
- CO3. Understand Mendelian laws, structure of DNA and gene expression.
- CO4. Understand Whittaker's system of classification and structure of virus.

M. Sc. Chemistry (Semester-II) (Session-2024-25)
BIOLOGY FOR CHEMISTS
COURSE CODE: MCHL-2056
(For Non-Medical Students)
(Theory)

Time: 3 Hrs. **Max. Marks: 50**

(Theory: 40, CA: 10)

Note: The students are allowed to use Non-Programmable Calculator.

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 unit 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

The Organization of Life

Biologically important molecules: Carbohydrates, lipids, proteins and nucleic acids.

The life of cells – The cell theory, general characteristics of cells, difference between prokaryotic and eukaryotic cells, difference between plant and animal cells, cell organelles.

UNIT-II

Tissues, organs and organ systems: Animal tissues; epithelial tissues, connective tissues, muscle tissue, nervous tissue and neoplasias; plant tissue: meristematic tissue, permanent tissues.

UNIT-III

Genetics

The basic principle of heredity: Mendals law, monohybrid cross, dihybrid cross.

DNA – Double helix structure and replication.

Genes expression: Transcription and translation, genetic code.

UNIT-IV

The Diversity of Life

The classification of Living things – Criteria of classification, Whittaker's systems of classification, their characteristics with are example of each.

Viruses, structure of Viruses.

Book Recommended:

1. Cord Biology - South Western Educational Publications, Texas, 200

ANNEXURE I

FACULTY OF LIFE SCIENCES

SYLLABUS

For

Bachelor of Science (Honours) Biotechnology
Semester II
(Under Credit Based Continuous Evaluation Grading System)

Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATION OF FOUR YEAR UNDER GRADUATE DEGREE PROGRAMME

Session-2024-25

Bachelor of Science (Honours) Biotechnology Semester -II									
Course Code	**Course Title**	**Course Type**	**Paper Credits L-T-P**	**Hours per week L-T-P**	**Total Marks**	**Marks**			**Exam Time in Hrs**
						L	**P**	**CA**	
BBTM-2484	Cell Biology	DSC	4-0-1	4-0-2	100	60	20	20	3+3

Bachelor of Science (Bio-Technology) Semester-II

Session: 2024-25

Course Code: BBTM-2484

Course Title: Cell Biology

(Theory)

COURSE OUTCOMES:

After passing this course the student will be able to:

- **CO1**. Understanding the basic unit of life – cell and broad classification of cell types.
- **CO2**. Understanding the structure and functions of cell organelles.
- **CO3**: Understand Cell Division and Cell Cycle.
- **CO4.** Understanding the biological membranes along with membrane transport mechanism.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2024-25

Course Code: BBTM- 2484

Course Title: Cell Biology

(Theory)

Time: 3 Hrs. **Theory: 60**

Credits: 4-0-0

Instructions for the Paper Setter

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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

Cell as a basic unit of living systems. The cell theory Broad Classification of Cell Types: PPLO's, bacteria, eukaryotic microbes, plant and animal cells. A detailed classification of cell types within an organism. Cell, tissue, organ and organism as different levels of organizations of otherwise genetically similar cells.

Unit-II

Structure and function of cell organelles, ultrastructure of cell membrane, cytosol, Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeletal structures (actin, microtubules etc.), Mitochondria, chloroplasts, lysosomes, peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin).

Unit-III

Cell Division and Cell Cycle: mitosis, meiosis, stages of cell cycle, binary fission, amitosis and its regulation. Cell-cell interaction, Cell locomotion (amoeboid, flagellar and ciliar).

Unit-IV

Biological Membranes: Supramolecular architecture of membranes; Solute transport across membranes; Model membranes and Liposomes.

Books Recommended:

1. De-Robertis, F.D.P. and De-Robertis Jr. E.M.F. (2017) Cell and Molecular Biology, Saunders, Philadelphia.

2. Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh and Matsudaira (2007) Molecular Cell Biology 6th Edition, W.H.Freemen& Co Ltd.
3. Geoffrey, M. Cooper & Robert E. Hausman (2013) The Cell: A molecular approach 6th Edition, Sinauer Associates.
4. Alberts, Johnson, Lewis, Raff, Roberts and Walter (2008) Molecular Biology of the Cell, 5th Edition, Garland Science.

Bachelor of Science (Bio-Technology) Semester-II

Session: 2024-25

Course Code: BBTM-2484 (P)

Course Title: Practical (Cell Biology)

(Practical)

COURSE OUTCOMES:

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**. Understand Microtomy, staining and histology of different tissues.
- **CO4**. Study about electron micrographs of different organelles

Bachelor of Science (Bio-Technology) Semester-II

Session: 2024-25

Course Code: BBTM-2484

Course Title: Practical (Cell Biology)

(Practical)

Time: 2 Hrs. **Practical: 20**

Credit: 0-0-1

Instructions for the practical Examiner: Question paper is to be set on the spot jointly by the internal and external examiners. Two copies of the same may be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar.

1. Study of Cells:

(a) Prokaryotic cells: Lactobacillus, E. coli. Blue green algae.

(b) Eukaryotic cells: Testicular material (for studies of spermatogenesis)

2. Study of electron micrographs of various cell organelles-plasma membrane, Mitochondria, Golgi complex, Lysosomes, Endoplasmic Reticulum (smooth and granular), Cilia, Centrioles, inclusions like glycogen, lipids, etc.
3. Preparation of Permanent Slides: Principles and procedures- Section cutting of tissues and staining of tissues with Haematoxylin/eosin method.
4. Study of permanent slides of various tissues (gut region, liver, lung, spleen, kidney, pancreas, testis, ovary, tongue, skin etc.).
5. Preparation of Buccal Smear for microscopic examination.
6. Barr body observation in human squamous epithelial cells.
7. Microtomy of Plant Tissue specimens (Stem & Root)

Books Recommended:

1. Shah, V.C., Bhatavdekar, J., Chinoy, N.J. and Murthy, S.K. (1988). Essential techniques in Cell Biology.Anand Book Depot, Ahemadabad.
2. Celis, J.E. (1998) Cell Biology: A Laboratory handbook. Vol. 1-3. Academic Press, UK.

ANNEXURE J

FACULTY OF LIFE SCIENCES

SYLLABUS

For

Bachelor of Science (Biotechnology) Semester IV
(Under Credit Based Continuous Evaluation Grading System)
(12+3 System of Education)

Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

KANYA MAHA VIDYALAYA, JALANDHAR (AUTONOMOUS)
SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR

DEGREE PROGRAM

Session-2024-25

Bachelor of Science (Biotechnology) Semester IV									
Course Code	**Course Title**	**Course type**	**Credits L-T-P**	**Credit Hours**	**Marks**				**Examination time (Hours)**
					L	**P**	**CA**	**Total**	
BBTL-4486	Zoology-II	C	2-0-0	2	40	-	10	50	3
BBTP-4482	Lab in Zoology-II	C	0-0-1	2	-	20	5	25	3

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2024-25

Course Code: BBTL-4486

Course Title: Zoology-II

(Theory)

Course Outcomes

After passing this course the student will be able to:

- CO1 Understand evolution of Prokaryotes and Eukaryotes.
- CO2 Understand the process and theories in evolutionary biology.
- CO3 Aware the students about various pathogenic protozoans and helminths and diseases caused by them in humans.
- CO4 Understand diseases caused by arthropod vectors and their control measures.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2024-25

Course Code: BBTL-4486

Course Title: Zoology-II

(Theory)

Time: 3 Hrs. **Max. Marks: 50**
Theory: 40
CA: 10

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). 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-1

Origin of Life on Earth: Origin of earth and primitive earth conditions, Theories of origin of life (Theory of Extraterrestrial contact- Import of life through meteorites, Special creation theory, Oparin Haldane Theory, Abiogenesis , Evidences against theory of spontaneous generation of life, Biogenesis, Theory of chemical evolution, Miller & Urey Experiment).

Evolution of Prokaryotes and Eukaryotes (unicellularity to multicellularity).

Unit-2

Evolution: Definition, Scope and History, Theories of Evolution (Lamarckism, Darwinism, Hugo de Vries and Modern theory of Evolution).

Geological time scale.

Unit-3

Introduction to Parasitology (pertaining to various terminologies in use).
Brief account of Life history, mode of infection and pathogenicity of the following pathogens with reference to man, prophylaxis and treatment.

Pathogenic Protozoans: Entamoeba, Trypanosoma, Giardia and Plasmodium.
Pathogenic Helminths: Tape Worm, Ascaris and Ancylostoma.

Unit-4

Arthropod vectors of human diseases: Malaria, Yellow fever, Dengue haemorragic fever, Filariasis, Plague and Epidemic typhus.

Distribution and control of the above mentioned vectors.

Books:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2024-25

Course Code: BBTP-4482

Course Title: Zoology-II

(Practical)

Course outcomes

After passing this course the student will be able to:

- CO1 Aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.
- CO2 Aware about the typhoid, cholera likes disease.
- CO3 Understand the evolutionary phenomena.

Bachelor of Science (Bio-Technology) Semester-IV

Session: 2024-25

Course Code: BBTP-4482

Couse Title: Zoology-II

(Practical)

Time: 3 Hrs. **Max. Marks: 25**

Practical: 20

CA: 5

Note: The question paper will be set by the examiner based on the syllabus.

1. Study of Evolutionary phenomenon with the help of charts / models /videos:

Homology, Analogy and Mimicry.

2. Study of the skeleton of human.

3. Study of the following prepared slides: histology of man (compound tissues).

4. Study of following prepared slides/specimen:

Pathogenic Protozoans: Entamoeba, Trypanosoma, Giardia and Plasmodium.

Pathogenic Helminths: Tape Worm, Ascaris and Ancylostoma.

Arthropod vectors of human diseases: Anopheles, Culex, Aedes Mosquitoes, Rat flea.

Books:

1. Sobti, R.C. & Nigam, S.K. (2002). Structural & function biology of chordates, Vishal Publishers, Jalandhar.
2. Sobti, R.C. & Sharma, V.L. (2005). Basics of Biotechnology: Introduction of Life Sciences. Vishal Publishers, Jalandhar.
3. Sobti, R.C. (2005). Introduction to Biotechnology, Part-2, Concepts Tools and Application, Vishal Publishers.

ANNEXURE K

KANYA MAHA VIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF AND EXAMINATION OF THREE YEAR DEGREE PROGRAMME

(Session 2024-2025)

B. Sc. (Home Science) Semester VI							
Course Code	**Course Name**	**Course Type**	**Marks**				**Examination time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
BHSM-6487	Applied Zoology and Food Microbiology	C	100	60	20	20	3+3

B.Sc. Home Science (Semester–VI) (Session 2024-25)

APPLIED ZOOLOGY AND FOOD MICROBIOLOGY

Course Code: BHSM-6487

(THEORY)

Course Outcomes

After passing the course, students will be able to

- CO1. Study useful and harmful insects.
- CO2. Learn about sources of food contamination and control of stored food pest.
- CO3. Knowledge about Beneficial effects of microorganisms.
- CO4. Understand the microbiology of food spoilage, Contamination and control of different food products

B. Sc. Home Science (Semester–VI) (Session 2024-25)

APPLIED ZOOLOGY AND FOOD MICROBIOLOGY

Course Code: BHSM-6487

(THEORY)

Max. Time: 3 Hrs. **Max Marks: 100**

Theory: 60

Practical: 20

CA: 20

Instruction for the Paper Setter.

- Eight questions of equal marks 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

Elementary study of the following harmful insects Mosquito (Culex, anopheles, beg bugs and louse).

Elementary study of economically important insects – honeybee, silk moth, lac and earthworm.

UNIT-II

Sources of food contamination, food poisoning Symptoms & control.

Control of pest cereals pulses and stored products such as rice weevil lesser grain and borer.

UNIT-III

Introduction to microbiology and its relevance to food standards & safety. General morphology and Characteristics of micro-organism-bacteria Virus protozoa.

Beneficial effects of micro-organism.

- Role of bacteria in milk and milk products industry.
- Soil fertility (Nitrogen Cycle)
- Economic Importance of moulds, Aspergillus Penicillium and yeast.

UNIT-IV

Microbiology of different food spoilage & Contamination & control of cereals and their products sugar and its products, vegetable and fruits, Meat and its products fish and other sea foods egg and poultry, milk and its products & canned foods.

Reference Books:

1) Text Book of Zoology P.S. Dhami, Pardeep Publication.
2) Food Microbiology Frazier, William C and West off Dannis C. Tata McGraw will Publish Company Ltd.

B. Sc. Home Science (Semester–VI) (Session 2024-25)
APPLIED ZOOLOGY AND FOOD MICROBIOLOGY
Course Code: BHSM-6487
(Practical)

Course Outcomes

CO1. To make the students aware about economically important specimens of insects (preserved).

CO2. Familiarize about the basic microflora.

B.Sc. Home Science (Semester–VI) (Session 2024-25)
APPLIED ZOOLOGY AND FOOD MICROBIOLOGY
Course Code: BHSM-6487
(Practical)

Time: 3 Hrs. **Marks:20**

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. Identification of insects (same as theory).
2. Identification and economic importance of Honey bee, silk moth, lac and earthworm.
3. Identification of pest with their morphological note (same as theory).
4. Identification of slides of following microbes-bacteria, Virus, protozoa.

ANNEXURE L

FACULTY OF LIFE SCIENCES

SYLLABUS

of

Environmental Studies (Compulsory)

for

Bachelor of Science (Medical) / Bachelor of Science (Non -Medical) / Bachelor of Science (Computer Science) / Bachelor of Commerce / Bachelor of Business Administration / Bachelor of Science (Home Science) / Bachelor of Computer Application /Bachelor of Science (Information Technology) / Bachelor of Science (Biotechnology)/ Master of Commerce (Five Year Integrated Programme) / Bachelor of Science (Economics)/ Master of Science (Mathematics) (Five Year Integrated Programme)

(Semester III)

(Under Continuous Evaluation System)(12+3 System of Education)

Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR

(Autonomous)

Kanya Maha Vidyalaya Jalandhar

Scheme and curriculum of Examinations of three year degreeprogram

Environmental Studies (Compulsory)

Semester-III (session 2024-25)

Bachelor of Science (Medical) / Bachelor of Science (Non -Medical) / Bachelor of Science (Computer Science) / Bachelor of Commerce / Bachelor of Business Administration / Bachelor of Science (Home Science) / Bachelor of Computer Application /Bachelor of Science (Information Technology) / Bachelor of Science (Biotechnology)/ Master of Commerce (Five Year Integrated Programme) / Bachelor of Science (Economics)/ Master of Science (Mathematics) (Five Year Integrated Programme)

(SEMESTER-III)

Course Code	Course Title	Course Type	Hours / week	Credit L-T-P	Marks				Examination time (in Hours)
					Total	Ext.		CA	
						Theory	Practical		
AECE-3221	Environmental studies	C	1-0-2	1-0-1	50	30	10	10	3

***C- compulsory course**

Session: 2024-25

Bachelor of Science (Medical) / Bachelor of Science (Non -Medical) / Bachelor of Science (Computer Science) / Bachelor of Commerce / Bachelor of Business Administration / Bachelor of Science (Home Science) / Bachelor of Computer Application /Bachelor of Science (Information Technology) / Bachelor of Science (Biotechnology)/ Master of Commerce (Five Year Integrated Programme) / Bachelor of Science (Economics)/ Master of Science (Mathematics) (Five Year Integrated Programme)

Semester- III

Course Code: AECE-3221

Course Title: Environmental Studies (Compulsory)

COURSE OUTCOMES:

After passing this course, students will be able to:

- CO1. Understand the concept and need of environmental education.
- CO2. Understand the role of an individual in conservation of natural resources.
- CO3. Learn about role of major Eco system and their conservation.
- CO4. Develop desirable attitude, value and respect for protection of Biodiversity.
- CO5. Learn about the control measure of pollution and solid waste management.
- CO6. Understand the role of different agencies in the protection of environment.
- CO7. Knowledge regarding welfare programmes and Human rights.
- CO8. Knowledge about the applied value of environmental studies.

Session: 2024-25

Bachelor of Science (Medical) / Bachelor of Science (Non -Medical) / Bachelor of Science (Computer Science) / Bachelor of Commerce / Bachelor of Business Administration / Bachelor of Science (Home Science) / Bachelor of Computer Application /Bachelor of Science (Information Technology) / Bachelor of Science (Biotechnology)/ Master of Commerce (Five Year Integrated Programme) / Bachelor of Science (Economics)/ Master of Science (Mathematics) (Five Year Integrated Programme)

Semester- III

Course Code: AECE-3221

Course Title: Environmental Studies (Compulsory)

(Theory)

Time: 3 Hrs. **Max. Marks: 50**

Credit: 1-0-1 **Theory: 30**

Practical: 10

CA: 10

Instructions for the Paper Setter:

The question paper should carry 30 marks. The structure of the question paper being:

Part-A: Attempt any five questions out of seven. Each question carries 2 marks. Answer to each questionshould not exceed 1 page

Part-B, Essay type with inbuilt choice – 20 marks

Attempt any five questions out of eight. Each question carries 4 marks. Answer to each questionshould not exceed 3 pages.

Unit 1

The multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness

Unit 2

Natural Resources: Renewable and non-renewable resources

Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction,mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflictsover water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using

mineralresources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effectsof modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use ofalternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion anddesertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3

Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems(ponds, streams, lakes, rivers, ocean estuaries)

Unit 4

Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and optionvalues
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Unit 5

Environmental Pollution

Definition

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

Unit 6

Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents andholocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Unit 7

Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health

- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Unit 8

Field Work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain
- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House,Delhi.
4. Joseph, K. & Nagendran, R. 2004. Essentials of Environmental Studies, Pearson Education(Singapore) Pte. Ltd., Delhi.
5. Kaushik, A. & Kaushik, C.P. 2004. Perspective in Environmental Studies, New Age International (P) Ltd, New Delhi.
6. Rajagopalan, R. 2011. Environmental Studies from Crisis to Cure. Oxford University Press,New Delhi.
7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies,Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House,New Delhi

ANNEXURE M

FACULTY OF LIFE SCIENCES

SYLLABUS

of

Environmental Studies (Compulsory)

for

BA/BA (JMC)/ B. Sc. (FD)/BA (Hons.) English

(Semester IV)

Session: 2024-25

KANYA MAHA VIDYALAYA
JALANDHAR

Kanya Maha Vidyalaya Jalandhar

Scheme and curriculum of Examinations of three year degree program
Environmental Studies (Compulsory)
Semester-IV (session 2024-25)

BA/BA (JMC)/ B. Sc. (FD)/BA (Hons.) English
(SEMESTER-IV)

Course Code	Course Title	Course Type	Hours/ week	Credits L-T-P	Marks				Examination time (in Hours)
					Total	Ext.		CA	
						Theory	Practical		
AECE-4221	Environmental studies (Compulsory)	C	1-0-2	1-0-1	50	30	10	10	3

***C- compulsory course**

Session: 2024-25
BA /BA (JMC)/ /B. Sc (FD)/BA (Hons.) English
Semester- IV
Course Code: AECE-4221
Course Title: Environmental Studies (Compulsory)

COURSE OUTCOMES:

After passing this course, students will be able to:

- CO1. Understand the concept and need of environmental education.
- CO2. Understand the role of an individual in conservation of natural resources.
- CO3. Learn about role of major Eco system and their conservation.
- CO4. Develop desirable attitude, value and respect for protection of Biodiversity.
- CO5. Learn about the control measure of pollution and solid waste management.
- CO6. Understand the role of different agencies in the protection of environment.
- CO7. Knowledge regarding welfare programmes and Human rights.
- CO8. Knowledge about the applied value of environmental studies.

Session: 2024-25
BA/BA (JMC)/ B. Sc. (FD)/BA (Hons.) English
Semester- IV
Course Code: AECE-4221
Course Title: Environmental Studies (Compulsory)

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Session: 2024-25
BA/BA (JMC)/ B. Sc. (FD)/BA (Hons.) English
Semester- IV
Course Code: AECE-4221
Course Title: Environmental Studies (Compulsory)
(Theory)

Time: 3 Hrs. **Max. Marks: 50**
Credit: 1-0-1 **Theory: 30**
Practical: 10
CA: 10

Instructions for the Paper Setter:
The question paper should carry 30 marks. The structure of the question paper being:
Part-A: Attempt any five questions out of seven. Each question carries 2 marks. Answer to each questionshould not exceed 1 page
Part-B, Essay type with inbuilt choice – 20 marks
Attempt any five questions out of eight. Each question carries 4 marks. Answer to each questionshould not exceed 3 pages.

Unit 1

The multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness

Unit 2

Natural Resources: Renewable and non-renewable resources
Natural resources and associated problems.

(a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction,mining, dams and their effects on forests and tribal people.

(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflictsover water, dams-benefits and problems.

(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineralresources, case studies.

(d) Food resources: World food problems, changes caused by agriculture and overgrazing, effectsof modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

(e) Energy resources: Growing energy needs, renewable and non-renewable energy sources,

use ofalternate energy sources, case studies.

(f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion anddesertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit 3

Ecosystems

- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposers
- Energy flow in the ecosystem
- Ecological succession
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems(ponds, streams, lakes, rivers, ocean estuaries)

Unit 4

Biodiversity and its conservation

- Introduction – Definition: genetic, species and ecosystem diversity
- Biogeographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and optionvalues
- Biodiversity at global, national and local levels
- India as a mega-diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Unit 5

Environmental Pollution

Definition

- Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution
- Solid waste management: Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution
- Pollution case studies
- Disaster management: floods, earthquake, cyclone and landslides

Unit 6

Social Issues and the Environment

- From unsustainable to sustainable development
- Urban problems and related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case studies.
- Environmental ethics: Issues and possible solutions
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents andholocaust. Case studies.
- Wasteland reclamation
- Consumerism and waste products
- Environmental Protection Act, 1986
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and control of Pollution) Act, 1974
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation
- Public awareness

Unit 7

Human Population and the Environment

- Population growth, variation among nations
- Population explosion – Family Welfare Programmes
- Environment and human health
- Human Rights
- Value Education
- HIV / AIDS
- Women and Child Welfare
- Role of Information Technology in Environment and Human Health
- Case Studies

Unit 8

Field Work

- Visit to a local area to document environmental assets river/forest/grassland/hill/mountain

- Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- Study of common plants, insects, birds
- Study of simple ecosystems-pond, river, hill slopes, etc

References:

1. Bharucha, E. 2005. Textbook of Environmental Studies, Universities Press, Hyderabad.
2. Down to Earth, Centre for Science and Environment, New Delhi.
3. Heywood, V.H. & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge House,Delhi.
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7. Sharma, J. P., Sharma. N.K. & Yadav, N.S. 2005. Comprehensive Environmental Studies,Laxmi Publications, New Delhi.
8. Sharma, P. D. 2009. Ecology and Environment, Rastogi Publications, Meerut
9. State of India's Environment 2018 by Centre for Sciences and Environment, New Delhi
10. Subramanian, V. 2002. A Text Book in Environmental Sciences, Narosa Publishing House, New Delhi

ANNEXURE N

FACULTY OF LIFE SCIENCES

SYLLABUS

of

Environmental Studies (Compulsory)

for

B. Voc. (Retail Mgt)/B. Voc. (MSP)/ B. Voc. (Photography & Journalism)
B. Voc. (Animation)/B. Voc. (TDAT)/B. Voc. (NEH)/B. Voc Beauty & Wellness
B. Voc. (Artificial Intelligence and Data Science), B. Voc. (Hospitality and Tourism)

(Semester IV)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2024-25

The Heritage Institution

KANYA MAHA VIDYALAYA

JALANDHAR

Kanya Maha Vidyalaya Jalandhar

Scheme and curriculum of Examinations of three year degreeprogram
Environmental Studies (Compulsory)
Semester-IV (session 2024-25)

B. Voc. (RM, MSP, Animation, TDAT, NEH, Beauty & Wellness, Artificial Intelligence and Data Science, Hospitality and Tourism, Photography & Journalism) **(SEMESTER-IV)**									
Course Code	**Course Title**	**Course Type**	**Hours/ week**	**Credits L-T-P**	**Marks**				**Examination time (in Hours)**
					Total	**Ext.**		**CA**	
						Theory	**Practical**		
AECE-4221	Environmental studies (Compulsory)	C	1-0-2	1-0-1	50	30	10	10	3

***C- compulsory course**

Session: 2024-25

B. Voc. (RM, MSP, Animation, TDAT, NEH, Beauty & Wellness, Artificial Intelligence and Data Science, Hospitality and Tourism, Photography & Journalism)

Semester- IV

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