Scheme and Syllabus

For

M. Sc. Zoology (CBCS)

Applicable from Session 2021-2022 to onwards

Department of Zoology

School of Life Sciences

Guru Ghasidas Vishwavidyalaya, Bilaspur (CG)

Post Graduate Program: M. Sc. Zoology (CBCS)
Offered by the Department of Zoology, School of Life Sciences

1. Name of the Program : Master of Science in Zoology

2. Specializations available : Biochemistry and Molecular Biology,
   Fish Biology,
   Mammalian Reproductive Physiology and Endocrinology, and Toxicology.

3. Program Specifications
   School of studies: School of Life Sciences
   Department: Department of Zoology
   Program: M.Sc. in Zoology
   Date of approval in Board of Studies: 24/12/2021

4. Mode of study: Full time (semester system)
   Class room teaching; experiential learning; tutorials; project assignments and dissertation work.

Purpose of the Program:

The Master of Science degree program in Zoology provides students the opportunity to enhance their knowledge and competence in the diverse field of animal science and encourages students to get indulges in the subject. Another focus of this program is to motivate students towards research. Students are encouraged to get involved in dissertation projects under the guidance of faculty mentors that address topics related to animal health, environment, nutrition, physiology, production, and behavior. The attainment of a master's degree also qualifies students to pursue further specialized training and gain entrance to professional schools, or to pursue a doctorate.

Learning outcomes:

- Students will be able to identify the major groups of organisms with an emphasis on animals and be able to classify them within a phylogenetic framework.
- Students will be able to compare and contrast the characteristics of animals that differentiate them from other forms of life.
- Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.
- Students will able to understand the concepts of physiology, nutrition, health and economics with reference to animals.
- Students will be able to explain the mechanisms and role of reproductive physiology, Immunology, toxicology & neurobiology in health & disease
- Students will be able to apply the scientific method to questions in biology by formulating testable hypotheses, gathering data that address these hypotheses, and analyzing those data and will be able to demonstrate critical thinking and problem solving skills in Biostatistics course.
- Students will be able to explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system.
- Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

Semester-wise Theory Papers/ Practical
Masters of Science in Zoology (CBCS)
Department of Zoology, School of Life Science

Course Opted	Course Code	Name of the Course	T-L-D /Week	Credits	CCA	ESE	Total
		Semester – Ist					
CC 1	**ZOPATT1**	Comparative Anatomy of Vertebrates	T-3	3	40	60	100
CC 1	**ZOPALT1**	Comparative Anatomy of Vertebrates	L-4	2	20	30	50
CC 2	**ZOPATT2**	Cell Biology	T-3	3	40	60	100
CC 2	**ZOPALT2**	Cell Biology	L-4	2	20	30	50
CC 3	**ZOPATT3**	Endocrinology	T-3	3	40	60	100
CC 3	**ZOPALT3**	Endocrinology	L-4	2	20	30	50
OE 1	**ZOPATO1**	To be drawn from the pool of OE	T-3	3	40	60	100
OE 1	**ZOPALO1**	To be drawn from the pool of OE	L-4	2	20	30	50
	***Certificate**	**UACE, VAC, CC, OCC and others offered by university**					
			28H/W	**20**	**240**	**360**	**600**
		Semester IInd					
CC 4	**ZOPBTT1**	Biochemistry and Molecular Biology	T-3	3	40	60	100
CC 4	**ZOPBLT1**	Biochemistry and Molecular Biology	L-4	2	20	30	50
CC 5	**ZOPBTT2**	Basic Mammalian Physiology	T-3	3	40	60	100
CC 5	**ZOPBLT2**	Basic Mammalian Physiology	L-4	2	20	30	50
CC 6	**ZOPBTT3**	Animal behavior	T-3	3	40	60	100
CC 6	**ZOPBLT3**	Animal behavior	L-4	2	20	30	50
DSE: 1	**ZOPBTD1**	Molecular Genetics	T-3	3	40	60	100
DSE: 1	**ZOPBLD1**	Molecular Genetics	L-4	2	20	30	50
RM	**ZOPBTA1**	Research Methodology	T-2	2	40	60	100
	***Certificate**	**UACE, VAC, CC, OCC and others offered by university**					
			30H/W	**22**	**280**	**420**	**700**
		Semester IIIrd					
CC 7	**ZOPCTT1**	Developmental Biology	T-3	3	40	60	100
CC 7	**ZOPCLT1**	Developmental Biology	L-4	2	20	30	50
CC 8	**ZOPCTT2**	Regulatory Mammalian Physiology	T-3	3	40	60	100
CC 8	**ZOPCLT2**	Regulatory Mammalian Physiology	L-4	2	20	30	50
CC 9	**ZOPCTT3**	Evolution, Environmental Biology and Sustainable Development	T-3	3	40	60	100
CC 9	**ZOPCLT3**	Evolution, Environmental Biology and Sustainable Development	L-4	2	20	30	50
DSE: 2	**ZOPCTD1**	Brain function and Mental Awareness	T-3	3	40	60	100
DSE: 2	**ZOPCLD1**	Brain function and Mental Awareness	L-4	2	20	30	50
	***Certificate**	**UACE, VAC, CC, OCC and others offered by university**					
			28H/W	**20**	**240**	**360**	**600**
		Semester IVth					
CC 10	**ZOPDTT1**	Biotechniques	T-3	3	40	60	100

CC 10	**ZOPDLT1**	Biotechniques	L-4	2	20	30	50
DSE: A	**ZOPDTD1**	Biochemistry of Intermediary Metabolism and Enzymology	T-3	3	40	60	100
DSE: A	**ZOPDLD1**	Biochemistry of Intermediary Metabolism and Enzymology	L-4	2	20	30	50
DSE: A	**ZOPDTD2**	Molecular Biology of Information Pathway: Nucleic Acids	T-3	3	40	60	100
DSE: A	**ZOPDLD2**	Molecular Biology of Information Pathway: Nucleic Acids	L-4	2	20	30	50
DSE: B	**ZOPDTD3**	Neuroendocrinology, Non-Classical Hormones and Signaling	T-3	3	40	60	100
DSE: B	**ZOPDLD3**	Neuroendocrinology, Non-Classical Hormones and Signaling	L-4	2	20	30	50
DSE: B	**ZOPDTD4**	Mammalian Reproduction, Fertility and Sterility	T-3	3	40	60	100
DSE: B	**ZOPDLD4**	Mammalian Reproduction, Fertility and Sterility	L-4	2	20	30	50
DSE: C	**ZOPDTD5**	Fish Anatomy, Physiology and Biotechnology	T-3	3	40	60	100
DSE: C	**ZOPDLD5**	Fish Anatomy, Physiology and Biotechnology	L-4	2	20	30	50
DSE: C	**ZOPDTD6**	Fish Culture, Capture Fishery and Fish Pathology	T-3	3	40	60	100
DSE: C	**ZOPDLD6**	Fish Culture, Capture Fishery and Fish Pathology	L-4	2	20	30	50
DSE: D	**ZOPDTD7**	Mechanism of Toxicity	T-3	3	40	60	100
DSE: D	**ZOPDLD7**	Mechanism of Toxicity	L-4	2	20	30	50
DSE: D	**ZOPDTD8**	Reactive Metabolites and Defense System in Biology	T-3	3	40	60	100
DSE: D	**ZOPDLD8**	Reactive Metabolites and Defense System in Biology	L-4	2	20	30	50
Dissert-ation	**ZOPDDD1**	Based on DSE Elected (I/II/III/IV)	D-14	7	80	120	200
	***Certificate**	**UACE, VAC, CC, OCC and others offered by university**					
			35H/W	**22**	**260**	**390**	**650**

1. Discipline Specific Electives (DSE) in forth semester for each session will be offered to students on the basis of availability of faculty and infrastructure.
2. Offering of DSE in any particular session will be decided after a formal meeting of all faculty members of Department of Zoology.
3. Each student may study any one out of the given electives (A, B, C and D). Elective papers will be distributed among the students on the basis of merit/choice.
4. The project work/dissertation will be carried out in the field of respective elective papers opted by the students.
5. Open Elective Courses will be offered by department in first semester is fundamental of public health / Applied Zoology.

Abbreviations:

CC= Core Course
OE= Open Elective
DSE= Discipline Specific Electives
DSE: I= Biochemistry and Molecular Biology
DSE: II = Mammalian Reproductive Physiology and Endocrinology
DSE: III= Fish Biology
DSE: IV= Toxicology
CCA= Continuous Comprehensive Assessment
ESE= End-Semester Examinations
UACE= University Additional Credit Electives,
VAC=: Value Added Course
CC= Certificate Courses,
OCC=: Online certificate Courses

SEMESTER IV

DISCIPLINE SPECIFIC ELECTIVE B

Mammalian Reproductive Physiology and Endocrinology

ZOPDTD4: MAMMALIAN REPRODUCTION FERTILITY AND STERILITY

Unit 1: Gonadotropins and Reproductive cycles: Structure, secretion and regulation of gonadotropins, Estrous and Menstrual cycle, Sexual/Gonadal and brain differentiation and behavior; Hormones of sexual behavior, Sites of action of sex hormones Primer pheromones; Estrous cycle disruption, male induction of estrus (whitten effect), male induced pregnancy block (bruce effect), human reproductive pheromones.

Unit 2: Regulation of gonadal function: Testicular function Spermatogenesis and hormonal regulation, Sertoli cell, Leydig cell, Cell– cell interactions; Epididymis: organization and function, male accessory sex glands: structural organization and endocrine regulation of prostate, functions of accessory sex glands; Ovarian function Follicular development and selection, oocyte maturation, mechanism of ovulation, hormonal and molecular changes during periovulatory period, factors involved in follicular rupture, follicular atresia, regulation of steroidogenesis.

Unit 3: Fertilization and Implantation: Hormonal control of gamete interaction, role of zona proteins, **g**amete activation, sperm-egg fusion; Hormonal control of puberty and pregnancy. Biology of implantation-Cellular aspects, molecular aspects, markers of developing embryo, cross-talk between embryo and uterus

Unit 4: Control of male and female fertility (Chemical interference): Suppression of spermatogenesis, Suppression of hypophysial activity by steroid hormones, Chemicals acting directly on the testis, Prevention of sperm maturation in epididymis, Surgical interference with reference to vasectomy; Inhibition of ovulation with reference to oral contraceptives, mechanical methods with reference to intrauterine devices, interferences and approaches.

Unit 5: Male and female sterility: Parameters of male sterility, origin and cause of male sterility, azoospermia, oligozoospermia, varicocoele, cryptorchidism; Tubal factors, premature ovarian failure, polycystic ovarian syndrome, luteal insufficiency, endometriosis.

Books Recommended

1. Leung and Adashi (2004)The Ovary, Raven Press.
2. Adashi et al. (1996) Reproductive Endocrinology, Surgery and Technology, Lippincott Raven Publishers.
3. Findlay (1994) Molecular Biology of the Female Reproductive System, Academic Press.
4. Knobil and Neill (1994) The Physiology of Reproduction, Vol. I-II, Raven Press.
5. Knobiland Neill (1998) Encyclopedia of Reproduction, Vol. 1-4, Academic Press.
6. Lamming (1984) Marshall's Physiology of Reproduction, Longman.
7. Hadley ME (2003) Endocrinology
8. Yadav BN (2011) Mammalian Endorinology, Vishal Publishing Group.

Percent Change From Previous Syllabus: 50.0 %

SEMESTER IV

DISCIPLINE SPECIFIC ELECTIVE B

Mammalian Reproductive Physiology and Endocrinology

ZOPDLD4: MAMMALIAN REPRODUCTION FERTILITY AND STERILITY

1. Demonstration of growth factors in ovary/testis.
2. Preparation and study of permanent slides of male and female reproductive organs.
3. Study of stages of spermatogenesis and spermeogenesis using histological slides of testis.
4. Biochemical estimation of 3β-hydroxysteroiddehydogenase.
5. Study of sperm motility, sperm morphology, and sperm count in rat.
6. Effect of cadmium chloride treatment on testis*in vitro*.
7. Biochemical estimation of succinate dehydrogenase and catalase activity.
8. Study of rat oestrous cycle using vaginal smear preparations.
9. Demonstration of implantation sites by pontamine blue (blue dye reaction) in mouse.
10. Demonstration of vesoctomy, tubectomy, hysterectomy, super ovulation & PCOS in rats.
11. Demonstration of antral follicle, corpus luteum, egg isolation, granulose and theca cells.

Course Objective:

To study the various causes and factor important for the fertility. It also deals about the reproductive pathophysiology of sterility.

Course Outcomes:

The study of such subject may be helpful in establishing the best clinical practices required for a counseling framework to such couple who are close to or facing the problems of sterility.

The knowledge will also be helpful in providing the different diagnostic techniques used in the fertility clinics and IVF centers.

Percent Change From Previous Syllabus: 50.0 %