

UNIVERSITY OF MUMBAI
No.UG/ 130 of 2008

Circular :-
A reference is invited to the Ordinances, Regulations and syllabi relating to the M.Phil. degree course vide pamphlet No.180 and to this office Circular No.UG/23 of 2008 dated 3rd April, 2008 and the Head, University Department of Life Sciences and the Principal of the affiliated colleges in Science are hereby informed that the recommendation made by the Board of Studies in Zoology at its meeting held on 23rd August, 2007 has been accepted by the Academic Council at its meeting held on 14th December, 2007 vide item No.4.3 and that, in accordance therewith, the M.Phil. degree course in Zoology has been introduced by the University from the academic year 2007-2008.

MUMBAI-400 032

for W/c. REGISTRAR

AC/4.3/14.12.2007

Copy forwarded with compliments for information to :-

- for I/c. REGISTRAR

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The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

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14/12/12

UNIVERSITY OF MUMBAI



**SYLLABUS FOR THE
M.PHIL. DEGREE
IN
ZOOLOGY**

(With effect from the academic year 2007-2008)

**DRAFT OF THE REVISED SYLLABUS OF
MASTER OF PHILOSOPHY (M.PHIL) PROGRAMME
IN ZOOLOGY**
(With effect from the academic year 2007-2008)

The Master of Philosophy (M.Phil.) in Zoology is a pre-doctoral degree programme intended to equip a prospective doctoral scholar with the necessary knowledge, skills and attitude required to undertake serious doctoral research study. It also aims to develop in the students an understanding of the teaching, learning and evaluation process. The programme is thus designed to enhance the professional and research skills of those who are already teaching Zoology subjects and also to create a strong orientation for research.

Detailed Syllabus

Paper I – Research and Teaching Methodology (50 lectures)

Hours – 50 No. of credits – 3

SECTION I – Research Methodology

25 L.

1. Objectives and significance of Research. Methods and methodology of good scientific research. Research process and criteria of good research work. Problems encountered by researchers in our country. 3 L.
2. Selecting and defining the problem. Techniques involved in defining a problem. Illustration and conclusion. 3 L.
3. Research design – Need for good research design. Important concepts relating to good research design and different research designs. Basic principles of experimental designs. 4 L.
4. Experimentation. Methods of Collecting primary and secondary data. Analysis and treatment of data. Communication of findings. 4 L.
5. Processing operations – Some problems in processing. 5 L.
- Statistics in Research – Measure of central tendency, Dispersion, skewness. Measures of relationships – Simple regression analysis, Multiple co-relation and regression partial correlation. Association in case of attributes. Other measures.
6. One way and two way Anova. Interpretation and Report writing. Meaning of Interpretation and its techniques. Significance of report writing. Different steps in writing a report. How to write a research proposal to be submitted to funding agencies. Funding agencies in India. 3 L.
7. Applications and use of different software packages for research. 3 L.

SECTION II – Teaching Methodology

25 L

1. Conventional Methodology – 4 L.
 - A: Organization of content: curriculum, scope and significance.
 - B: Elucidation of concept – simple to complex, whole to part, concrete to abstract, known to unknown.
 - C: Pronunciation of biological terms and meanings
 - D: Interdisciplinary aspects
 - E: Synopsis and Bibliography
2. Innovative Techniques -
 - A: Models and simulations
 - B: Posters and teaching tools
 - C: Computers as teaching tools – computer based models
 - D: Case studies as teaching tools
 - E: Problem based learning 5 L
3. Laboratory work, Field work and projects –
 - A: Laboratory work : Experimental Design, Protocol and record maintenance.
 - B: Survey: Designing the questionnaire. Report writing.
 - C: Group activity: Consortia. Report writing. 3 L
4. Resources: 3

- A: Text books, reference books, manuals and memoirs.
B: Research papers, journals, abstracts, proceedings of seminars,
conferences.
C: Magazines, newspapers, articles etc.
D: Soft media – CDs, DVDs, Internet
3. Modern Goals of Education as incorporated in the preamble of the Indian Constitution (Art. No. 41, 45, 46) 5 L
Goals of education according to the education commission (1964 – 1966)
National education policy (1986 & 1992)

References:

- 1) C.R.Kothari – Research Methodology
- 2) Aggarwal J.C. – Theory and Principles of Education
- 3) Bhatia K.K. and Narang C.L. - Principles of Education
- 4) Naik J.P. – Education Commission and After
- 5) N.C.E.R.T. – The Teacher and Education in Emerging Society
- 6) Yadav H.S. and Yadav S. - Education in Emerging Indian Society

SECTION I – Modern Trends in Environmental Biology

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|---|-------------|
| 1. Biodiversity and Conservation | 25 L |
| Threatened and loss of biodiversity, Conservation methods, Biodiversity Prospecting | |
| 2. Conventions on Biodiversity and Bioprospecting | 5L |
| How bioprospecting relates to biodiversity conservation, Bioprospecting agreements, Bilateral and multilateral contracts, Bio-piracy legal implications, Indigenous Traditional Knowledge(I.T.K.), Patent issues of T.K., Current status and application in India. | |
| 3. Hotspots, Bio-safety, Ecological modeling | 5L |
| Remote sensing and Geographical Information Systems- Applications in Environment | |
| 4. Environmental Management | 6L |
| Global change and Terrestrial ecosystem, International biosphere measurement of air pollution with the help of satellite. | |
| 5. Environmental Management | 5L |
| Development and environmental linkages, Environmental concerns in India, The need for sustainable development, Wasteland management, Actions for environmental protection, National and International initiatives I.S.O. framework, Ecosystem approach, Emerging environmental management in the 21 st century e.g. Fresh water availability-global crisis, rain water harvesting. | |
| 5. Environmental audit | 4L |
| Types of environmental audits, General steps in an environmental audit procedure, Overview of elements of audit process, Audit protocols (Why, Who and How), Audit certificates and authorization. | |

SECTION II – Immunology and Bioprospecting for Pharmaceuticals **25 L**

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|--|-----------|
| 1. Immunology in Human Health and Disease and its Clinical Analysis | 5L |
| B cell development in health and disease, Antimicrobial strategies, Infectious diseases. | |
| 2. Cellular and Molecular Immunology | 6L |
| Chemokines, Cytokines, Autoimmunity, Cancer Biology, Impact of Prostaglandins on cancer patients immunity, Applications of Prostaglandins inhibitors for cancer immunotherapy, Immunology of Gene Transfer, DNA – Vaccines | |
| 3. Discovery of Novel Compounds | 4L |
| Ethnobotanical approach and screening, production from macroalgae and mangroves, Collecting and harvesting medicinal plants and storage, Bloom forming algae and their secondary metabolites. | |
| 4. New compounds from Marine Animals | 5L |
| Natural products from marine invertebrates especially sessile forms, Secondary metabolites from invertebrates and fishes, Poisonous and | |

venomous forms, Venom apparatus, Methods of collection of sessile marine invertebrates.

5. Isolation of Bioactive Compounds
Preparation of crude compounds, Isolation of pure compounds, Bio assay guided isolation, High throughput screening of extracts, Associated microflora that produce the bioactive metabolites, their isolation, culture and extraction of compounds.

51.

References:

- 1) G.Tyler Miller Jr. – Essentials of Ecology Third Edition, Thompson Books
- 2) Eugene Odum – Ecology
- 3) Samuelsson G. – A Text Book of Pharmacognosy 4th Edition, Swedish Pharmaceutical Society, 1999
- 4) H.V.Jadhav – Environmental Management Edition Jan. 2002, Vipul Prakashan, Mumbai
- 5) R.K. Jain & others – Environmental Management
- 6) Environmental Impact Assessment Analysis Handbook
- 7) L. Canter – Environmental Assessment 2nd Edition
- 8) K.C.Agarwal – Environmental Laws, Nidhi Publishers
- 9) H.V.Jadhav – Environmental Protection & Laws, Himalaya Publishing House
- 10) Ahmad Iqbal et al. – Modern Phytomedicine – turning medicinal plants into drugs, Wiley VCH Publishers
- 11) Trivedi, Pravin Chandra – Medicinal Plants :Traditional Knowledge, I.K. International Publishing House
- 12) Sharma, P.C., Yelne – Database on Medicinal plants used in Ayurveda 4 volumes, Central Council for Research in Ayurveda and Siddha
- 13) Laxmi Chandra Mishra – Scientific Basis for Ayurvedic Therapies, CRC Press
- 14) Norman Grainger – Herbal Drugs and Pharmaceuticals, Med Pharma Scientific Publishers
- 15) Dewick Paul – Medicinal Natural Products: A Biosynthetic Approach, John Wiley and Sons Ltd.
- 16) Harvey Alan, Ellis Horwood – Drugs for Natural Products, Pharmaceutical and Agrochemicals
- 17) Liebler Danier – Introduction to proteomic tools for new biology
- 18) Julio Licio, Ma Liwang – Pharmacogenomics: The search of Individualized Therapies, Wiley Publishers
- 19) Ashutosh Kar – Pharmacognosy and Pharmabiotechnology
- 20) Michael Wink – An Introduction to Molecular Biotechnology, Wiley VCH
- 21) Misener Stephen, Krawetz Steph – Bioinformatics: Methods and Protocols Methods in Molecular Biology, Human Press
- 22) K.G. Ramawat, J.M. Merillon – Biotechnology, Oxford and IBH Publishing Co. Pvt. Ltd.
- 23) S.S. Purohit – Biotechnology, Agrobios (India)



SECTION I – Any one of the following:- A/B/C/D
(The chosen group should necessarily be other than the subject of specialization offered at M.Sc. Part II)

40 L.

Group A – Oceanography, Fishery Science and Aquaculture

40 L.

I) General Oceanography

10 L.

a) Physical Oceanography – Equation of state of sea water, current system including undercurrent, their formation and theories, Oceanic forms of water masses mixing and double diffusion, Ocean waves and tides.

b) Chemical Oceanography – Major and minor constituents of sea water and their residence time, processes controlling the composition of sea water. Dissolved gases in sea water – Carbon-dioxide system, distribution of alkalinity, Biogeochemical cycling.

II) Biometric studies – Measurement of length and weight, Morphometric measurements, Meristic counts, Biometric index. 10 L

III) Aquaculture – World aquaculture, Role, Importance, Status production trend, Important species, Current Concepts of culturable Fin fishes and Shell fishes. 10 L

Field culture – Ponds, running water, recycled water, cage culture, pen culture, sea ranching and artificial recruitment. Culture site, its requirement, and nursery and grow out pond. Polyculture – farm construction

IV) Biotoxinology – with reference to marine animals 10 L

References:

1. Svedrup – The Oceans
2. Harold Thurman – Introductory Oceanography, Prentice Hall London
3. S.Z.Quasim – Glimpses of Indian Ocean, Sangam Bodes Ltd. London, Navya Printers, Hyderabad
4. R.Gordon Pirje – Oceanography
5. David Ross – Introduction to Oceanography
6. A.A.Fincham – Basic Marine Biology, British Museum Natural History
7. J.S.Levington – Marine Biology – function, biodiversity, ecology, Oxford University Press
8. J.P.Riley & R.Chester – Introduction to Marine Chemistry, Academic Press London & New York
9. J.V.R.Pillai – Aquaculture – Principles and practice, Blackwell Scientific Publication
10. Halstead – Venomous and Poisonous Marine Animals (3 volumes)
11. Williamson et. Al. – Venomous and Poisonous Marine Animals

Group B – Endocrinology

I) General Endocrinology and Comparative Endocrinology	40 L
II) Molecular basis of Endocrinology	10 L
III) Fundamentals of Clinical Endocrinology	10 L
IV) Applied Endocrinology – Pheromones and their applications, Husbandry, Human Fertility Management, Hormonal Contraception, IVF etc.	10 L

References:

1. Leycock & Wise – Essential Endocrinology, 2nd Edition, ELBS Oxford University Press
2. Barington 1979 – Hormones and Evolution (Volume I and II), Academic Press New York
3. John F. et.al. – Essentials of Endocrinology, 5th Edition, Saunders Press London
4. Hadley – Endocrinology
5. Bagnara & Turner – General Endocrinology, W.B.Saunders
6. E. Knobil, J.U.Neil – The Physiology of Reproduction (Volume I & II), Raven Press New York

Group C – Animal Physiology

I) Physiological Adaptations to different Environments	40 L
II) Concepts of Work Physiology	20 L
III) Concepts of Sports Physiology	10 L

References:

1. Schmidt Nielson Knut – Animal Physiology 1990 Adaptations and Environment, Cambridge University Press
2. R.Eckert & D.Randall 1982 – Animal Physiology 2nd Edition, W.H.Freeman & Co.
3. W.A.Hoar 1983 – General and Comparative Animal Physiology 3rd Edition, Prentice Hall Inc.
4. C.L.Prosser 1973 - Comparative Animal Physiology, W.B.Saunders
5. R.W.Hill 1978 - Comparative Physiology of Animals An Environmental Approach, Harper & Row Publication
6. J.G.Philips 1975 – Environmental Physiology, Blackwell Scientific Publication
7. J.R.Bernstein 1972 – Biochemical responses to Environmental Stress, Academic Press
8. Sandhya Tiwari – Exercise Physiology, Sports Publications Delhi
9. K.Chandrashekar – Sports Physiotherapy, Khel Sahitya Kendra Delhi
10. Srivastava A. – Physiology of Exercise and Sports Medicine (Hindi), Amit Brothers Nagpur

Group D – Entomology

General Entomology – Origin and evolution of insects, taxonomy of insects upto Orders stating examples of Insects of Economic Importance, Mechanism of Insect flight, Neuro-biochemicals of insects, Intermediary metabolism in insects, Effector organs, Hormones and Ectohormones	40 L
ii) Biodiversity of Insects – Dynamics of insect population, Aquatic insects and insects with reference to altitude, Role of insects in agriculture	10 L
iii) Forensic Entomology	10 L
iv) Insect Behavior and Physiological Interpretations (Mating, Ovipositor, Parental Care)	10 L
Insects as Human Food	10 L

References:

1. Saxena – Ecology of Insects, Anmol Publications, New Delhi
2. F.Yazdan & Aggarwal- Elements of Insect Ecology, Narosa Publications
3. G.T.Tonapi – Fresh Water Animals of India (An ecological approach), Oxford and I.B.S. Publication
4. V.C.Kapoor – Evolution of Insects, Kalyani Publications
5. R.J.Alzinga – Fundamentals of Entomology
6. Ross H.H., Ross C.A., Ross J.R.P. – Text book of Entomology Edition 4, John Wiley and Bones New York
7. Richards O.W. & Davis R.G. – General Text book of Entomology Edition 10, Chapman & Hall London
8. Mani M.S. – General Entomology Edition 3, Oxford and I.B.H. Publication New Delhi
9. Snodgrass R.E. – Principles of Insect Morphology, T.M.H. Publication
10. Wigglesworth V.B. – Insect Hormones
11. Tembhare D.B. – Text book of Insect Morphology, Physiology and Endocrinology 2nd Edition, S.Chand & Co. New Delhi
12. Kerkut G.A. & Gilbert L.L. – Comprehensive Insect Physiology, Biochemistry and Pharmacology Volume 1 – 13, Pergamon Press Oxford and New York

SECTION II

10 L

CPCSEA – Guidelines

Ethical Issues

Maintenance of Animal House

Care and Breeding of Animals

I.P.R. [Intellectual Property Rights]

Patent Infringement

Legal Issues involved in Biological Research

Question Paper Pattern

For examination in the theory subjects the following will be the pattern in setting questions –

	Marks	Continuous assessment	No. of questions to be set	No. of questions to be answered	Duration of Exam/Hours
Paper I	75	25	7	5	3
Paper II	75	25	7	5	3
Paper III	75	25	7	5	3
Dissertation	100 + 100 Viva=Voce on dissertation				

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