

M.Phil., ZOOLOGY

SEM	SUB CODE	COURSE	SUBJECT TITLE	HRS / WEEK	CREDIT	CIA Mark	ESE MARK	TOTAL MARK
I	20MPZO1CC1	Core I	Research Methodology	4*	4	25	75	100
	20MPZO1CC2	Core II	Advances in Biological Research	4*	4	25	75	100
	20MPZO1CC3	Core III	Teaching and Learning Skills (Common Paper)	4*	4	25	75	100
	20MPZO1CC4	Core IV (Elective)	Paper on Topic of Research (The syllabus will be prepared by the guide and examination will be conducted by the COE)	4*	4	25	75	100
			*One hour library for each course					
TOTAL				16*	16	100	300	400
II	20MPZO2PD		Dissertation##	-	8	-	-	200
GRAND TOTAL				-	24	-	-	600

##Evaluation of the Dissertation and Viva Voce shall be made jointly by the Research Supervisor and the External Examiner.

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPZO1CC1	Core –I	RESEARCH METHODOLOGY	4	4	100	25	75

Objective: To expose students to the concept of research and to provide a background knowledge on the application of research tools.

UNIT – I: Research – Objectives – Types, Importance and Processes – Literature survey – Printed and online journals – Refereed journals, Impact Factor, Citation Index. Abstracts and Indices – Technical papers – Reviews – Monographs – Preparation of Index cards – Use of Internet in Literature survey. Identification and selection of Research Problem – Experimental design – Planning and execution of investigation. Preparation and Writing of Thesis: Components of thesis; Preparing of scientific papers for publication to a Journal and presenting insymposia/seminar.

UNIT – II: Model organisms – culture and maintance. CPCSEA regulations – Patent. Spectrophotometry (Principle, types, description and applications). Centrifugation (Principles, types, description and applications). Chromatography: Ion – exchange chromatography, GLC and HPLC (Principles, description and applications). Electrophoresis – Types: – PAGE, SDS-PAGE, 2D Electrophoresis. Immunoelectrophoresis – ELISA – Blotting techniques – Southern, Western and Northern – Principle and applications.

UNIT – III: Microtechnique: Permanent mounting – Narcotization and Killing – fixing – washing – Tissue processing – Staining – mounting – Labeling. Histochemistry – Carbohydrate, Protein, Lipid and Nucleic acids. Microscopy: Types, Principle and applications of Light microscopes and Electron microscopes (SEM and TEM) Studies – Histological preparation of tissues for SEM and TEM. Photomicrography: principle and applications.

UNIT-IV: Methods in Microbiological Studies: Isolation and culture of microorganisms – mixed cultures; physical chemical and biological methods. Methods of isolation and maintenance of pure culture. Microbial growth – growth curve of bacteria – measurement of growth. Culture media – characteristics – types and preparation. Staining and smearing.

UNIT V: Statistical Methods: Hypothesis testing. Tests of Significances: Student's "t" test, F – Test – One way and Two way ANOVA with interpretation of data – Multiple comparison tests – LSD, SNK, DMRT. Correlation and regression: Correlation (Pearson's and Spearman's Rank), partial and multiple correlation – simple linear regression and multiple regressions. Non-Parametric Tests: Chi square, Mann Whitney "U", Wilcoxon's test and Kruskal Wallis tests.– use of SPSS for statistical analysis.

List of Books for References:

1. Anderson, D. P. 1970. Thesis and Assignment Writing, Wiley Eastern Limited.
2. Grumani, N. 2006. Research Methodology for Biological Sciences. MJP Publishers, Chennai. P753.
3. Pelczar, M.J. and R.D. Reid. 1996. Microbiology. Tata Mc GrawHill, NewDelhi.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 1995. Cell and Molecular Biology. 8th Edition, B.I. Waverly Pvt. Lid., NewDelhi.
5. Das, H.K (Editor) 2005. Text book of Biotechnology. Wiley dreamtech India Pvt Ltd., New Delhi.
6. Daniel, W.W. 2000. Biostatistics – A foundation for analysis in the Health sciences. John Wiley and Sons, NewYork.
7. Gupta, P.K. 2004. Biotechnology and Genomics (I Edition) Rastogi Publications, Meerut.
8. Ivan Roitt, David Male, and Jonatham Brostoff. 2002. Immunology. Mosby Edinbrugh, London.
9. Palanichamy, S. and M. Shunmugavelu, 1997. Research Methodology in Biological sciences. Palani Paramount publications, Palani.
10. Pearson. Histochemistry Vol. I & II.
11. Zar, J.H. 2003. Biostatistical Analysis. Pearson Education Asia, NewDelhi.
12. Dubey, R.C and Maheshwari, D.K. 1999. A text book of microbiology. S.Chand & Co Ltd., NewDelhi.

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPZO1CC2	Core – II	ADVANCES IN BIOLOGICAL RESEARCH	4	4	100	25	75

Objective:

To study the recent advances in molecular genetics and biotechnology: Also to understand their benefits to improve man's quality of life.

UNIT – I: Environmental Biology: Pollution Abatement Measures: Bioremediation – Solid Waste Management – Biofertilizers and Biopesticides – Environmental Impact Assessment (EIA) – Environmental Laws in India. **Biological Diversity:** Types – Genetic, Species and Ecosystem diversity – Values of biodiversity – Biodiversity indices: Alpha, beta and gamma – Threats to Biodiversity – IUCN Categories – Red Data Book – Conservation of biodiversity – *ex situ* and *in situ*. GPS, GIS, Remote sensing and Radio telemetry techniques used in Ecological Research – Molecular Markers in Genome analysis – RFLP, RADP, AFLP and their applications in Biodiversity.

UNIT – II: Microbiology and Microbial Techniques: Microbial diversity – Prokarya – Eukarya and Viruses – Microbial diseases of Man – Bacterial, Fungal, Viral diseases – Chemotherapy and antibiotics – Vaccines – rDNA Vaccines – applications. Molecular mapping of genome – Genome organization. Cloning technology and its application in biology – Ethical issues – Terminator genes – Merits and demerits.

UNIT – III: Immunological Techniques: Antigen – Antibody interactions – Isolation of pure antibodies – Assays of complement – Assays for circulating immune complexes – Isolation of lymphocyte populations Effector cell assays, Gene targeting Immunological techniques in medical diagnosis – HIV, Hepatitis A & B, Cancer and Pregnancy.

UNIT-IV: Animal Biotechnology: Basic techniques of Mammalian cell cultures – Cell lines – Manipulation of cultured cells and tissues – Application of Animal cell cultures – Stem cell cultures – Apoptosis – Protein Engineering – Transgenic animals – Advantages. Gene Therapy. Human Genome Project – DNA fingerprinting and its applications – Biosensors and

Biochips and their Applications – **Plant Biotechnology:** Explants and their incubation – Regeneration of plants from callus – Applications of Tissue cultures – Transgenic plants – IPR and PatentRights.

UNIT – V: Bioinformatics: Scope of Bioinformatics – Genomes and Proteomes – The genome of *Homo sapiens* (the human genome). Single Nucleotide Polymorphisms. Biological Databases – Primary, Secondary, Specialized and Structural database. Databases searches for homologous sequences – FASTA, BLAST and molecular docking. Local and global alignment concepts – Clustal-W –Phylogenetic trees – clusteringmethods.

List of Reference Books:

1. Krishnamurthy, K.V. 2004. An advance Text book on Biodiversity. Principles and Practice. Oxford & IBH Publishing Co. Pvt. Ltd., NewDelhi.
2. Das, H.K. (Editor) 2005. Text Book of Biotechnology. Wiley Deramtech India Pvt. Ltd., New Delhi.
3. Jogdand, S.N. 2004. Advances in Biotechnology. Himalaya publishing House, Mumbai.
4. Benjamin Lewin. 1999. Genes VII. Oxford University Press, NewYork.
5. Kumar, H.D. Modern concepts of Biotechnology. Vikas Publishing House Pvt. Ltd., New Delhi.
6. Kumar, D and Kumar, S. 1998. Modern concepts in Microbiology, Vikas Publishing house Pvt. Ltd., New Delhi.
7. Ivan Roitt, David Male and JonathamBrostoff. 2002. Immunology. Mosby Edinburgh, London.
8. Anathanarayanan, R, and C.K., JayaramamPaniker. 1990. Text book of Microbiology. OrientLondon.
9. Pelczar, M.J. and R.D. Reid. 1996. Microbiology. Tata McGrawHill.
10. De Robertis, E.D.P. and De Robertis, E.M.F. 1995. Cell and Molecular Biology. 8th Edition, B.I. Waverly Pvt. Lid., NewDelhi.
11. Attwood, T.K. and PLarry– Smith, D.J. 2002. Introduction to Bioinformatics, Pearson Education(Singapore).
12. Lesk, A.M., 2007. Introduction to Bioinformatics (S.E.), Oxford University,Oxford.
13. Mani, K. and Vijayaraj, N., 2004. Bioinformatics. A Practical Approach, Aparnaa publications,Coimbatore.
14. Murthy, C.S.V., 2003. Bioinformatics, Himalaya Publishing House, NewDelhi.
15. Sundararajan, S. and Balaji, R. 2002. Introduction to Bioinformatics, Himalaya Publishing House, NewDelhi.
16. Westhead, D.R., Parish, T.H. and Twyman, R.M., 2003. Instant Notes: Bioinformatics BIOS Scientific Publisher Ltd, Oxford,UK.

Semester	Code	Course	Title of the Course	Hours	Credits	Max. marks	Internal marks	External marks
I	20MPZO1CC3	Core – III	TEACHING AND LEARNING SKILLS	4	4	100	25	75

Objective:

To analyze and improve the intricacies of teaching and learning methods.

UNIT-I: Computer Applications Skills: Computer system: Characteristics, parts and their functions – Different generations of computer – Operation of computer: switching on/off/restart. Mouse control, Use key board and some functions of key – Information and Communication Technology (ICT): Definition, Meaning, Features, Trends. Integration of ICT in teaching and learning – ICT applications: Using word processors, Spread sheets, Power point slides in the classroom.

UNIT-II: Communication Skills: Definitions – Elements of communication: Sender, Message, Channel, Receiver, Feedback and Noise – Types of Communication – Spoken and Written; Non-verbal Communication – Intrapersonal, Interpersonal, Group and Mass communication – Barriers to communication: Mechanical, Physical, Linguistic & Cultural – Skills of communication: Listening, Speaking, Reading and Writing – Methods of developing fluency in oral and written communication – Style, Diction and Vocabulary – Classroom communication and dynamics.

UNIT-III: Communication Technology: Communication Technology: Bases, Trends and Developments – Skills of using Communication Technology – Computer Mediated Teaching: Multimedia, E-Content – Satellite-based communication: EDUSAT and ETV Channels. Communication through web: Audio and Video applications on the internet, Interpersonal communication through the web. Browsing Techniques, Website: Pub-med, Springer Link, Science directs.

UNIT-IV: Pedagogy: Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a Lecture – Narration It new with the nature of different disciplines – Lecture with power point presentation – Versatility of Lecture technique – Demonstration: Characteristics, Principles, Planning, Implementation and Evaluation – Teaching-learning Techniques: Team Teaching, Group discussion, Seminar, Workshop, Symposium and Panel Discussion – Modes of teaching: CAI, CMI and WBI.

UNIT-V: Teaching Skills: Teaching skill: Definition, Meaning and Nature – Types of Teaching skills: Skill of Set induction, Skill of Stimulus Variation, Skill of Explaining, Skill of Probing, Questions, Skill of Black Board Writing and Skill of Closure – Integration of Teaching Skills – Evaluation of TeachingSkills.

List of Reference Books:

1. Bela Rani Sharma (2007). Curriculum Reforms and Teaching Methods, Sarup and sons, NewDelhi.
2. Don Skinner (2005). Teacher Training, Edinburgh University Press Ltd., Edinburgh.
3. Information and Communication Technology in Education: A Curriculum for schools and programme of Teacher development, Jonathan Anderson and Tom Van Weart, UNESCO,2002.
4. Kumar, K.L (2008). Educational Technology, New Age International publishers, NewDelhi.
5. Mangal, S.K (2002), Essential of Teaching – Learning and Information Technology, Tandon Publications,Ludhiana.
6. Michael, D and William (2000). Integrating Technology into Teaching and Learning: Concepts and Applications, prentice Hall, NewYork.
7. Pandey, S.K (2005). Teaching Communication, Commonwealth Publishers, NewDelhi.
8. Ram Babu, A and Dandapani, S (2006). Microteaching (Vol.1 &2), Neelkammal Publications,Hyderabad.
9. Singh, V.K and Sudarshan, K.N (1996). Computer Education, Discovery Publishing Company, New York.
10. Sharme, R.A (2006). Fundamentals of Educational Technology, Surya Publications,Meerut.
11. Vanaja, M and Rajasekar, S (2006). Computer Education, Neelkamal Publications,Hydrabad.