



M.Phil. ZOOLOGY (FT/PT) PROGRAMME

(For the candidates to be admitted from the academic year 2018-19 onwards)

ELIGIBILITY : Life Sciences at post graduate level.

PROGRAMME OBJECTIVES :

To comprehend and to acquire knowledge on research problems, instrumentations related with research work, understanding publication ethics, gaining knowledge and application of statistical tools in research fields.

To understand the basic principles of bioinformatics tools, immuno-techniques, molecular structure of cells, methods of biodiversity conservations and bioremediation.

PROGRAMME STRUCTURE

Sem-ester	Course	Title of the Course	Exam. Hours	Credits	Marks		
					IA	UE	Total
I	Course - I	Research Methodology	3	4	25	75	100
	Course - II	Recent Advances in Zoology	3	4	25	75	100
	Course - III	Teaching and Learning skills (Common Paper)	3	4	25	75	100
	Course - IV	Paper on Topic of Research (The syllabus will be prepared by the Guide and the examination will be conducted by the COE)	3	4	25	75	100
II	---	Dissertation and Viva-Voce Viva Voce 50 marks Dissertation 150 marks	--	8	--	--	200
Total				24	--	--	600

PROGRAMME OUTCOMES :

To make the students to analyse the research problems with available funding agents, to acquire knowledge on research instrumentation, to apply research and statistical techniques and to publish their results with ethics, and to gain knowledge on recent advances in zoology.

COURSE I

RESEARCH METHODOLOGY

Course Objectives :

The students gain knowledge on

- Identifying research problem and the basic methods of experimentation.
- Methods of preparation of articles and its publication ethics.
- Instrumentation and its applications in research.
- Statistical packages and their applications.

Unit I

Scope – Identification and Selection of Research Problem – Methods of literature collection: online, Internet and Website, Technical papers, Reviews, Monographs and Abstract services - Experimental approach -Designing of Methodology – Planning and Execution of Investigations – Methods of Editing and Abstracting, Preparation of Manuscript and Proof Reading – Research ethics- plagiarism-Thesis Writing.

UNIT II

Preparation and presentation of research papers for Journals - Refereed journals -Symposia and Conferences– Impact factor – H-index – Citation index – IPR – Patents, Copyright – Preparation of research proposals - Funding agencies: TNSCST, UGC, DST, DBT, ICMR, CSIR.

Unit III

Microscopy: Phase contrast microscope, Fluorescence microscope Electron Microscopy: SEM, TEM, STM and ESTM – Principles and applications.

Chromatography: Principles and Applications - TLC, CG, GLC, HPLC and GCMS.

Electrophoresis: Principles and Applications – Agarose Gel, SDS-PAGE, Immuno-electrophoresis – Southern, Northern and Western Blotting.

UNIT IV

Tracer techniques: Radiation measuring devices – Geiger Muller Counter-Scintillation Counter – Autoradiography - Principles and Applications.

Spectroscopy: UV-Vis – ESR – NMR – AAS – MS – Principles and applications.

Unit V

Statistical methods and application:–Test of Significance – Student's 't' – test – Chi – Square test, 'F' test – Analysis of Variance – one way, two way and multiple way of analysis – Correlation - regressions. SPSS Package-Statistical analysis using EXCEL.

Reference Books

1. Anderson, Durston, Polle (1970). Thesis and Assignment Writing, Wiley Easter Limited.
2. Allen, H. Benton, William, E. Verner, Jr. (1974). Field Biology and Ecology, McGraw Hill Book Co., New York.
3. King, B. (1986). Cell Biology. London, Allen and Unwin Boston, London.
4. Kumar, H.D. (1998). Modern concepts of Biotechnology. Vikas Publishing House Pvt. Ltd., New Delhi.
5. Ramakrishnan. S., Swamy, R. (1995). Text book of clinical (Medical) Biochemistry and Immunology, TR. Publications, Chennai.
6. N. Gurumani (2006). Research Methodology: For Biological Sciences, MJP Publishers.
7. L. Veerakumari (2009). Bioinstrumentation. MPP Publishers, Chennai.

Course outcomes:

Research methodology provides the following :

- It makes the understanding of finding a problem, related data collection from sources and designing and executing.
- The funding sources providing financial support and other related online sources.
- The method of publishing an article and impact factor.
- Principles and applications of reliable methods and instruments.
- The statistical applications on data improvisation.

COURSE II

RECENT ADVANCES IN ZOOLOGY

Course Objectives :

The students are provided with

- Knowledge on bioremediation and conservation of biodiversity.
- Molecular studies and cell culture techniques and reproductive technologies.
- Stem cell technology for human welfare.
- Basic exposure to transcriptomics and metabolomics.
- Immuno-techniques and molecular diagnostics.
- An introduction to bioinformatics and phylogeny.

Unit I

Bioremediation – Bio-Indicators and Molecular markers – Biodiversity – Types and conservation - *In situ*, *Ex situ*, Alpha and Beta - Measures of diversity – Biodiversity conservation laws – Remote sensing and GIS – Basic concepts – Biofertilizers – Composting – Biopesticides – SCP – Production and sources.

Unit II

DNA sequencing - Human genome project – DNA finger printing and foot printing, DNA Bar coding, PCR – Types – Genomic Library – DNA recombinant technology – Cloning Vectors – Enzymes – Screening and applications – Animal cell culture – Primary and established cell line – Stem cell therapy. Cloning technique and its application – Ethical issues – Reproductive technologies related to human in vitro fertilization.

Unit III

Somatic mutation and oncogenes – Induction of mutation by mutagens, Teratogens – Carcinogens – Production of recombinant protein, insulin and growth hormone. Protein Engineering – Enzyme Technology – Transcriptomics - Metabolomics – Transgenic animals and their uses.

Unit IV

Organization and expression of immunoglobulin gene – Production and Types of Vaccines – development of AIDS and malaria vaccines – Applications of RIA – immunofluorescence – ELISA – Monoclonal antibodies in diagnosis of various diseases – Molecular Diagnostics – Karyotyping - FISH – RFLP – HLA – Tissue typing – organ transplantation.

Unit V

Bioinformatics: Generalized and specialized data bases with examples – BLAST – Multiple sequence alignments – Molecular divergence and Phylogenetic trees.
Nanobiology: Scope - Characteristics of nanoparticles – Types-synthesis - Nanosensors – Applications.

Reference Books

1. Abbas, A.K., Lichtman, A.K., Pober, J.S. (1998). Cellular and Molecular Immunology. 3rd Edition, W.B.Saunders Company, U.S.A.
2. Benjamin Lewin (1999). Genes VII. Oxford University Press, New York.
3. Branden, C., Tooze, J. (1999). Introduction to protein structure. II Edition, Garland Publishing, Inc., New York.
4. Desmond, S.T., Nicholl. (1994). An introduction to genetic engineering Cambridge University Press, New York.
5. HAWKINS, J.D. (1996). Gene structure and expression. III Edition. Cambridge University Press, New York.
6. Robert, W. Kelsall, Ian W. Hamley and Mark Geoghegan (2005). Nanoscale Science and Technology, John Wiley & Sons, Ltd., UK,
7. Charles P. Poole Jr and Frank J. Owens (2003). Introduction to Nanotechnology, Wiley Interscience.
8. Teresa K. Attwood David Parry (2009). Introduction to Bioinformatics, Smith. Pearson Education.
9. N. Gurumani (2011). An Introduction to Biostatistics. MJP Publishers.

Course outcomes:

- The knowledge on biodiversity, ethics and its conservation strategies.
- Molecular studies on gene sequencing and submission.
- Stem cell technology and their applications in human welfare.
- Transgenic studies and the engineering of genes.
- Acquaintance in immuno-techniques and its wide exposure in molecular diagnostics.
- An exposure on bioinformatic tools and evolutionary analysis.

COURSE III

Teaching and Learning Skills

Course Objectives :

- Acquaint different parts of computer system and their functions.
- Understand the operations and use of computers and common Accessories.
- Develop skills of ICT and apply them in teaching learning context and Research.
- Appreciate the role of ICT in teaching, learning and Research.
- Acquire the knowledge of communication skill with special reference to its elements, types, development and styles.
- Understand the terms communication Technology and Computer mediated teaching and develop multimedia /e- content in their respective subject.
- Understand the communication process through the web.
- Acquire the knowledge of Instructional Technology and its Applications.
- Develop different teaching skills for putting the content across to targeted audience.

Unit I : Computer Application Skills

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 – ICT for Research: On-line journals, e-books, Courseware, Tutorials, Technical reports, Theses and Dissertations-- **ICT for Professional Development**: Concept of professional development; institutional efforts for competency building; individual learning for professional development using professional networks, OERs, technology for action research, etc.

Unit II : Communications Skills

Communication: 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 : Pedagogy

Instructional Technology: Definition, Objectives and Types – Difference between Teaching and Instruction – Lecture Technique: Steps, Planning of a Lecture, Delivery of a Lecture – Narration in tune 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.

Unit IV : E- Learning, Technology Integration and Academic Resources in India

Concept and types of e-learning (synchronous and asynchronous instructional delivery and means), m-learning (mobile apps); blended learning; flipped learning; E-learning tools (like LMS; software's for word processing, making presentations, online editing, etc.); subject specific tools for e-learning; awareness of e-learning standards- Concept of technology integration in teaching- learning processes; frameworks guiding technology integration (like TPACK; SAMR); Technology Integration Matrix- Academic Resources in India: MOOC, NMEICT; NPTEL; e-pathshala; SWAYAM, SWAYAM Prabha, National academic depository, National Digital Library; e-Sodh Sindhu; virtual labs; eYantra, Talk to a teacher, MOODLE, mobile apps, etc.

Unit V : Skills of Teaching and Technology based assessment

Teaching skills: 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 Teaching Skills- **Technology for Assessment:** Concept of assessment and paradigm shift in assessment; role of technology in assessment 'for' learning; tools for self & peer assessment (recording devices; e-rubrics, etc.); online assessment (open source software's; e-portfolio; quiz makers; e- rubrics; survey tools); technology for assessment of collaborative learning like blogs, discussion forums; learning analytics.

References

1. Bela Rani Sharma (2007), Curriculum Reforms and Teaching Methods, Sarup and sons, New Delhi
2. Brandon Hall , E-learning, A research note by Namahn, found in: [www.namahn.com/resources/ .../note-e-learning.pdf](http://www.namahn.com/resources/.../note-e-learning.pdf), Retrieved on 05/08/2011
3. Don Skinner (2005), Teacher Training, Edinburgh University Press Ltd., Edinburgh
4. Information and Communication Technology in Education: A Curriculum for schools and programmed of Teacher Development, Jonathan Anderson and Tom Van Weert, UNESCO, 2002.
5. Jereb, E., & Šmitek, B. (2006). Applying multimedia instruction in e-learning. Innovations in Education & Teaching International, 43(1), 15-27.
6. Kumar, K.L. (2008) Educational Technology, New Age International Publishers, New Delhi.
7. Learning Management system : https://en.wikipedia.org/wiki/Learning_management_system , Retrieved on 05/01/2016
8. Mangal, S.K (2002) Essential of Teaching – Learning and Information Technology, Tandon Publications, Ludhiana.
9. Michael,D and William (2000), Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New york.

10. Pandey,S.K (2005) Teaching communication, Commonwealth Publishers, New Delhi.
11. Ram Babu,A abd Dandapani,S (2006), Microteaching (Vol.1 & 2), Neelkamal Publications, Hyderabad.
12. Singh,V.K and Sudarshan K.N. (1996), Computer Education, Discovery Publishing Company, New York.
13. Sharma,R.A., (2006) Fundamentals of Educational Technology, Surya Publications,Meerut
14. Vanaja,M and Rajasekar,S (2006), Computer Education, Neelkamal Publications, Hyderabad.

Course Outcomes

After completing the course, the students will:

- Develop skills of ICT and apply them in Teaching Learning context and Research.
- Be able to use ICT for their professional development.
- Leverage OERs for their teaching and research.
- Appreciate the role of ICT in teaching, learning and Research.
- Develop communication skills with special reference to Listening, Speaking, Reading and Writing.
- Learn how to use instructional technology effectively in a classroom.
- Master the preparation and implementation of teaching techniques.
- Develop adequate skills and competencies to organize seminar / conference / workshop / symposium / panel discussion.
- Develop skills in e-learning and technology integration.
- Have the ability to utilize Academic resources in India for their teaching.
- Have the mastery over communication process through the web.
- Develop different teaching skills for putting the content across to targeted audience.
- Have the ability to use technology for assessment in a classroom.
