

M.PHIL. / PH.D.  
**COURSEWORK**  
**SYLLABUS**

OF

**Botany/Zoology/Microbiology/Biotechnology**

(w.e.f. 2018 )

Revised as per Ministry of Human Resource Development, UGC New Delhi,  
Notification 5<sup>th</sup> May, 2016, (Minimum Standards and Procedure for award of M.Phil.  
/ Ph.D. Degrees) Regulation – 2016



Re-Accredited Grade 'A' by NAAC

**DEPARTMENT OF BIOSCIENCES**  
**SAURASHTRA UNIVERSITY**  
**RAJKOT – 360 005**

## **M. Phil. / Ph.D. COURSEWORK**

### **RESEARCH METHODOLOGY**

#### **Unit – 1. Fundamentals of Research Methodology**

- 1.1 Basic Research Methodology: Research problem, Aims & Objectives, Hypotheses testing. Literature collection: Types & sources of research literature, reviews and its documentation
- 1.2 Experimental designing, setting up detailed methodologies & protocol, sampling methods, Strategies for execution of the protocols, statistical validation
- 1.3 Research design & Data collection, data analysis
- 1.4. Data Interpretation and Report Writing: Thesis, Report and Paper writing, Paper presentation, Bibliographic Citations, Bibliographic styles.

#### **Unit – 2. Research Ethics & Plagiarism**

- 2.1 Research Misconduct, rules and regulations in India. Data Management Mentoring, mentor-mentee responsibilities, Authorship Guidelines, Publication and Peer Review, plagiarism, Collaboration
- 2.2 Reporting and representing research, Representing images, Bias, Conflicts of Interest
- 2.3 Ethical use of animal subjects, CPCSEA regulations, Protection of Human subjects, Stem Cells, The Ethics of Plant Use, transgenic crops, Agricultural Ethics
- 2.4. Eco-sourcing code of practice, radioactive, chemical and biohazard safety, waste management and disposal, Social Responsibility and Whistleblowing

#### **Unit – 3. Quantitative Methods in Biology: Biostatistics**

- 3.1 Significance tests: Student's 't' test: Hypotheses, acceptance and rejections, significance levels.
- 3.2 Analysis of Variance: General principles, completely randomized and random-block design ANOVA.
- 3.3 Regression and correlation – bivariate regression analysis.
- 3.4 Chi-Square and its applications.

#### **Unit – 4. Computational Biology & IPR**

- 4.1 Databases for Biological studies: Nucleotide & Protein Databases – Primary and secondary databases, macromolecules 3D structure databases.
- 4.2 Sequence alignment-Basic terminologies, Local, Global, Pairwise and multiple sequence alignments, Phylogenetic tree-Databases and Tools, Primer designing tool
- 4.3 Databases including plant, animal and microbial diversity and genome databases
- 4.4 Overview of IPR: Types, Patents, Trademarks, Copyright and Related Rights, Patents & their specifications, Invention in context of prior art, Patent databases & Searching, International Databases.