



Ph.D. Course Work Syllabus

**Department of Botany
Tripura University
Suryamaninagar-799 022
Tripura**

COURSE STRUCTURE (ONE SEMESTER COURSE)

Research Methodology I: BT-1101 (100 Marks)

Research Methodology-II: BT-1102 (100 Marks)

Advance areas of Research: BT-1103 (100 Marks)

Practical: BT-1104 (100 Marks)

RESEARCH METHODOLOGY-I

Credit-4

Total Marks: 100

The whole paper is divided into four units as follows:

Unit-1: Basic Computer Applications

Unit-2: Quantitative methods, Statistics and application of Computer in statistics

Unit-3: Research Ethics and IPR

Unit-4: Documentation and scientific writing

Unit-1: Basic Computer Applications

Basic computer knowledge, Features and applications related to presentation of text in suitable format and saving the data for future applications. Use of word processing, Practical knowledge of MS Word to type the script, insert tables, figures and graphs, plotting of graphs in excel, Preparation of power point presentations based on the topic of research. Insertion of figures, graphs, charts in presentation. Use of spreadsheet and database software, Preparation of scientific posters for presentations, Internet and its application: Email, WWW, Web browsing, acquiring technical skills, drawing Inferences from data, Cloud computing.

Unit-2: Quantitative methods, Statistics and application of Computer in statistics

Measures of Central tendency and Dispersion. Probability distribution- Normal, Binomial and Poisson distribution. Parametric and Non-parametric statistics. Confidence interval, Errors. Quantitative Techniques: Levels of significance, Regression and Correlation coefficient. Statistical analysis and fitting of data; Chi-Square Test, Association of Attributes t-Test ANOVA Standard deviation, Co-efficient of variations. Open source software for quantitative and statistical analysis.

Unit-3: Research Ethics and IPR

Environmental impacts - Ethical issues - ethical committees - Commercialization – Copy right – royalty - Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

Unit-4: Documentation and scientific writing:

Results and Conclusions, Preparation of manuscript for Publication of Research paper, Presenting a paper in scientific seminar, Thesis writing. Structure and Components of Research Report, Types of Report: research papers, thesis, Research proposal, Research Project Reports, Pictures and Graphs, citation styles, writing a review of paper, Bibliography.

RESEARCH METHODOLOGY-I I

Credit-4

(A) Review and critics of Published works:

Review of published research papers in different fields of plant sciences; submission

(1 credit) 25 marks

(B) Power point presentation of review work

(1 credit) 25 marks

(C) Field work:

(1 credit) 25 marks

Biodiversity assessment of phytoresources of Tripura: at least two field tour in two attitudinal gradients/ Industry visit/ Research Institute visit and submission of report.

(Survey: 15 marks; submission: 10 marks)

(D) Hands on training:

(1 credit) 25 marks

- i. Techniques of novel indigenous mushroom spawn preparation
- ii. Sequence alignment and database searching
- iii. *In silico* primer designing
- iv. Sequence submission in Gene Bank
- v. Construction of phylogenetic trees.

ADVANCE AREAS OF RESEARCH

4 Credits

Total Marks: 100

I. Gene in reproductive development in plant: MADs box genes and flower development – revised ABC model; Reporter Gene and GUS activity in molecular embryogeny; Cell cycle and role of Cyclins; Programmed Cell Death; microRNA, RNA interferences. Genomic imprinting. Metagenomics, DNA chips, DNA microarray; Signal transduction: receptors and G-protein, two component sensor- regulator system in bacteria and plants. Mechanism of action of phytohormone in photomorphogenetic responses. Mechanism of biotic and abiotic stress tolerance. Techniques of plant transformation principle, theory and characterization of transgenic and applications. Safety aspects of genetically modified crops.

II. Recent trends in plant taxonomy. Population dynamics. Molecular evolution, molecular clock and molecular phylogeny; Use of conserve sequences and DNA barcoding in molecular phylogeny; RNA world. DNA Recombinant technology. Niche modeling. Remote sensing methods. Phytoremediation. Immobilization of microbial enzymes. Microbial degradation of hydrocarbons. Allelopathy and allelochemicals; Phytoalexins; Systemic acquired resistance (SAR), Resistance (R) Proteins, self-incompatibility and role of systemin.

4 Credits

Total Marks: 100

PRACTICAL:

BASED ON THE THEORY PAPERS