# Ph.D. MICROBIOLOGY COURSE WORK CURRICULUM

# 2014-15



# **DEPARTMENT OF MICROBIOLOGY**

**TRIPURA UNIVERSITY (A Central University)** 

SURYAMANINAGAR, AGARTALA – 799 022

TRIPURA, INDIA

## Ph.D. MICROBIOLOGY SYLLABUS

#### **TRIPURA UNIVERSITY**

#### (w.e.f. session 2014-2015)

#### Syllabus prescribed for the degree of Doctor in Philosophy in Microbiology.

The following are the details for the Examination:

<u>Course work</u>	<u>Max Marks</u>
<u>Theory</u>	
Paper -1: RESEARCH METHODOLOGY AND SCIENTIFIC WRI	<b>TING</b> (100)
Paper -2: BIOSTATISTICS, BIOETHICS, BIOSAFETY AND BIOINFO	
Paper -3: RESEARCH TECHNIQUES IN CLASSICAL AND MODERN	
	(100)

#### **Practical**

Paper -4: PROJECT BASED ASSIGNMENT AND REVIEW (100)

Total 400

### DEPARTMENT OF MICROBIOLOGY

### SYLLABUS FOR PH. D COURSE WORK

# Paper – I. RESEARCH METHODOLOGY AND SCIENTIFIC WRITING (100)

#### Unit-1: An overview of research methodology

Research Concept, Selection and formulation of research problem, hypothesis and its logical justification. Literature survey: textual and digital resources.

#### **Unit-2: Data collection & Interpretation**

Research design; Research plan. Collection, documentation, analysis, presentation and interpretation of data.

#### **Unit-3: Scientific writing**

Article, notes, reports, review article, monographs, dissertations, popular science articles, References and bibliography.

#### Unit-4: Basics of Manuscript preparation for scientific publication

Formulation of outline, drafting title, sub titles, tables, illustrations; Formatting tables - title, body footnotes; Figures & graphs - structure, title and legends.

#### Unit-5: Presentation, reporting and citation of research articles

Ethics of publication, presentation of data, citation and journal impact factors.

# Paper-IIBIOSTATISTICS,BIOETHICS,BIOSAFETYANDBIOINFORMATICS(100)

#### Unit -1: Computer assisted biostatistics

Computation of mean, variance and standard Deviations, Standard error, t test, correlation coefficient, Linear regression and ANOVA using Excel and statistical software like SPSS.

#### Unit-2: Microscopic image processing and analysis

Basics of some image processing software and various types of associated measurement. Analysis of microscopic images.

#### **Unit-3: IPR and Bioethics**

History of bioethics, purpose and scope and principles of bioethics, medical ethics and issues. Patents, copyright and related rights, industrial designs, trade secrets, IPR for new varieties.

#### Unit-4: Safe practices in laboratories

Fundamentals of biosafety in laboratory, levels of biosafety Laboratories (BS-I, BS-II and BS-III), need and application of biosafety, radio safety and chemical safety

#### **Unit- 5: Bioinformatics**

Fundamental concepts of genomics, proteomics, metabolomics. Bioinformatics databases. Search tools, interpretation of results with examples.

## Paper- III. RESEARCH TECHNIQUES IN CLASSICAL AND MODERN MICROBIOLOGY (100)

#### **Unit-1: Microbial Isolation techniques**

Methods of sample collection and preservation techniques; Surface sterilization, various culture techniques.

#### Unit-2: Characterization of microbial isolate

Morphological characterization by Phase contrast and Electron microscopy. Physiological characterization: growth behaviour studies, utilization of different carbon sources. Biochemical Characterization: estimation of extra-cellular enzymes, reducing sugars, free amino acids etc. Ribosomal DNA analysis, constructing phylogenetic trees.

#### **Unit-3: Metagenomics**

Non-culturable bacteria, New approaches for exploring non-culturable bacteria from environmental samples, culture independent molecular methods. FAME.

#### Unit -4 Analysis of molecular structure

Basics of crystallography, Biomolecular NMR, GC-MS and MALDI-TOF

#### Unit -5: Structural enzymology

Methods of enzyme purification and characterization using available biophysical and biochemical methods, protein-protein interactions and molecular docking.

### Paper- IV. PROJECT BASED ASSIGNMENT AND REVIEW

(50 + 50=100)

- A. Project based assignment.
- B. Review and presentation.