THIRUVALLUVAR UNIVERSITY
MASTER OF PHILOSOPHY
M.PHIL. MICROBIOLOGY
(FT/PT)
PART I
CORE COURSE I
RESEARCH METHODOLOGY

UNIT-I: RESEARCH METHODOLOGY
Meaning of research - Objectives of research - motivation of research - Types, approaches and significance - Methods versus methodology - Research in scientific methods - Research process - Criteria for good research - Problem encountered by research in India - Funding agencies.

UNIT-II: RESEARCH DESIGN
Research Problem: Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Research design - Needs and features of good design - Different research design - Basic principles of experimental designs.

UNIT-III: DATA COLLECTION AND DOCUMENTATION
Data collection methods - Data types - Processing and presentation of data - Techniques of ordering data - Meaning of primary and secondary data - The uses of computers in research - The library and internet - Uses of search engines - virtual libraries - common software for documentation and presentation.

UNIT-IV: DATA AND ERROR ANALYSIS
Statistical analysis of data - Standard deviation - Correlation - Comparison of sets of data - Chi squared analysis for data - Characteristics of probability distribution - Binomial, Poisson and normal distribution - Principle of least square fittings - Curve
fitting - Measurement of errors - Types and sources of errors - Determination and control of errors.

**UNIT-V: RESEARCH COMMUNICATION**


**REFERENCE BOOKS:**

5. Introduction to Computers - N. Subramanian
7. Research Methodology Methods and Statistical Techniques - Santosh Gupta.
8. Statistical Methods - S.P. Gupta
PART I

CORE COURSE II

ADVANCED MICROBIOLOGY

UNIT-I:
Discovery of microbes, abiogenesis vs biogenesis, Culture media - types of culture media, special media. Methods of isolating pure cultures, methods of maintenance and preservation of pure cultures. Unculturable microbes, quorum sensing.

UNIT-II:
Microscopy - light microscopy (bright field, dark filed, phase contrast, fluorescence, UV microscopy), Electron microscopy (SEM, TEM), and Acoustic microscopy, Microbial stains - Acidic dyes, Basic dyes, neutral dyes; Staining procedures - simple, differential, acid fast and negative staining.

UNIT-III:
Microorganisms in soil fertility, rhizosphere, mycorrthiza, biological nitrogen fixation, biofertilizers, biological control, biopesticides.

UNIT-IV:
Microbes in industry, Industrial fermentation, Bioreactors, batch fermentation, continuous fermentation and Fed-batch fermentation. Production of antibiotics (Penicillin) and vaccines. Food microbiology.

UNIT-V:
Sewage treatment - Physical, biological and chemical process.
Bioremediation: Approaches to bioremediation - environmental modification, microbial seeding, bioengineering; Bioremediation of contaminated soil, aquifers, air pollutants, marine oil pollutants.
REFERENCE BOOKS:

1. General microbiology - Powar & Danginwala Himalaya publications.