Ph.D. Microbiology

CURRICULUM AND SYLLABUS
2013 ONWARDS

Microbiology Programme
SCHOOL OF LIFE SCIENCES
PONDICHERRY UNIVERSITY
Ph.D. Course for Microbiology, Pondicherry University

Paper 1. Research Methodology

Course Code: MB 601
Total Number of Lecture hours: 46

Unit 1 10 h


Unit 2 10 h

Design of Experiments: Objectives, strategies, Factorial experimental design, Designing engineering experiments, basic principles-replication, randomization, blocking, Guidelines for design of experiments. Single Factor Experiment: Hypothesis testing, Analysis of Variance components (ANOVA) for fixed effect model; Total, treatment and error of squares, Degrees of freedom, Confidence interval; ANOVA for random effects model, Estimation of variance components, Model adequacy checking. Two factor Factorial Design, Basic definitions and principles, main effect and interaction, response surface and contour plots, General arrangement for a two-factor factorial design; Models-Effects, means and regression, Hypothesis testing.

Unit 3 8 h

Advanced Techniques in Microbiology: Denaturing Gradient Gel Electrophoresis (DGGE), Terminal Restriction Fragment Length Polymorphism (T-RFLP), Amplified Ribosomal DNA and Restriction Analysis (ARDRA) - NMR, Fluorescence, Atomic Absorption, CD, ORD, Mass, Raman Spectroscopy – PFGE – MALDI-ToF, TEM and SEM

Unit 4 10 h

Microbial Sequence analysis. Preparation of ordered cosmid libraries, bacterial artificial chromosomal libraries, shotgun libraries and sequencing, conventional sequencing (Sanger, Maxam and Gilbert Methods), next-generation sequencing methods - Sequence analysis: Computational methods, homology algorithms (BLAST) for proteins and nucleic acids, open reading frames, annotations of genes, conserved protein motifs related structure / function (PROSITE, PFAM, Profile Scan). DNA analyses for repeats (Direct and inverted), palindromes, folding programmes. Use of Internet, public domain databases for nucleic acid and protein sequences (EMBL, GeneBank), database for protein structure (PDB).

Unit 5 8 h

Biosafety levels – IBC – Institutional ethical committees – Good Laboratory Practices and Good Manufacturing Practices – regulations on rDNA products - Commercialization – Copy right – trademark - designs – royalty - Intellectual property rights and patent law – patent laws in India -

**Recommended Text Books:**

1. Montgomery, Douglas C. (2007), 5/e, Design and Analysis of Experiments, (Wiley India)

**Suggested Reading:**