Pt Ravishankar Shukla University, Raipur

Syllabus for PhD Course Work in Microbiology 2024-25

Program code Ph. D. MB 0410

There are two papers each having 100 marks, the candidate must obtain 50% or more marks in each paper independently to qualify the course work.		
Paper I **MB 0410A**	**Research and publication ethics, advance tools and techniques, Data analysis and computer fundamentals**	
	Content	**Marks**
A	**Research and publication ethics :** Ethics with respect to science and research Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP) Publication ethics: definition, introduction, and importance, Conflicts of interest Patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability,	25
B	**Research**: Scope and significance – Types of Research – Research Process – Characteristics of good research – Problems in Research – Identifying research problems. **Research Designs** – Features of good designs. Sampling design: Meaning – Concepts – Steps in sampling – Criteria for good sample design.	**25**
C	**Microbiological Techniques**: Basic techniques for isolation, cultivation, and enumeration of Microorganisms; Staining of microorganisms;preservation and maintenance of pure culture; sterilization techniques. **Microscopy**: bright field microscopy, dark field microscopy, fluorescence microscopy, phase contrast, and electron (transmission and scanning) microscopy; Confocal laser scanning microscopy. **Spectroscopy** - Electromagnetic spectrum, Beer Lambert's Law. UV/VIS Spectrophotometry, Infrared spectroscopy, FTIR, Atomic absorption spectroscopy, NMR spectroscopy. Mass	**25**

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	spectroscopy. **Chromatography:** paper, thin layer, gas (LCMS, GC-MS), Rf value, Qualitative and preparative techniques, Gel permeation, ion exchange, HP-TLC, HPLC, FPLC and affinity chromatography. **Molecular techniques**: PCR, real time PCR, PCR in molecular diagnostics; viral and bacterial detection; Transformation, electroporation, transfection; construction of libraries. Enzymatic DNA sequencing; chemical sequencing of DNA; automated DNA sequencing; RNA sequencing;	
D	**Data analysis and computer application**: Data presentation, Measures of central tendency; Measure of disparity: Standard deviation, Standard error, Correlation and regression. Probability theory and distributions: Binomial, Poisson, and Normal distributions. Statistical inference- Hypothesis testing (t-test, Chi-square test), ANOVA for one way and two way classified data. **Introduction to MS office** : MS word, MS excel, Power point. Presentation tools : Introduction, features and functions, Presentation of Power Point. **Web Search:** Introduction to Internet, Use of Internet and WWW, Use of search engines. Online tools to search required information effectively; Reference Management Software like Zotero/Mendeley; Software for detection of Plagiarism.	**25**
Paper II **MB 0410B**	**Review of literature and seminar**	
i	Review of Literature–Writing review of literature in the area of the proposed Ph.D. work	**50**
ii	Seminar–Based on the review of literature	**50**

Note: Research and Publication Ethics (2creditcourse)-As per guidelines of Pt. Ravi Shankar Shukla University, Raipur (C.G)

Recommended Books:

1. Buranen Land Roy AM Perspectives on Plagiarism and Intellectual Property in a Post-Modern World
2. Campbell RC Statistics for biologists
3. Casse l P *et al.* Inside Microsoft Office Professional
4. Chatwal and Chatwal Instrumentation
5. C R Kothari Research Methodology:Methods&techniques,2008
6. Gilmore B Plagiarism: Why it happens, How to prevent it?

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