

Institute of Microbiology and Molecular Genetics
Faculty of Life Sciences
University of the Punjab, Lahore
Course Outline



Programme	BS	Course Code	MMG311	Credit Hours	3
Course Title	SCIENTIFIC INQUIRY & RESEARCH METHODS				
COURSE INTRODUCTION					
This course is designed to introduce the fundamental principles and methods of scientific inquiry, enabling the students to critically evaluate research studies, design and conduct their own research projects, and communicate research findings effectively.					
LEARNING OUTCOMES					
On the completion of the course, the students will be able to:					
<ol style="list-style-type: none"> 1. Explain the principles of scientific inquiry and research design in microbiology. 2. Analyze and interpret data using appropriate research methodologies. 3. Apply research methods to conduct independent studies and contribute to microbiological knowledge. 					
COURSE CONTENT					
Introduction to Scientific Inquiry and research methods: Overview of the scientific method, Importance of science research, Ethical considerations in research, Research Design: Types of research designs (experimental, quasi-experimental, descriptive), Sampling methods and techniques, Measurement and instrumentation, Data Collection Methods: Surveys and questionnaires, Interviews and focus groups, Observational studies, Laboratory experiments. Data Analysis: Descriptive statistics, Inferential statistics (hypothesis testing, confidence intervals). Data visualization, Research Communication: Writing research reports and papers, Presenting research findings orally and poster presentations. Peer review and feedback					
BOOKS					
<ol style="list-style-type: none"> 1. Franklin, M. I. (2012). <i>Understanding research: Coping with the quantitative-qualitative divide</i>. Routledge.London. 2. Merriam, S. B. (2014). <i>Qualitative Research: A Guide to Design and Implementation</i>. John Wiley & Sons. 3. Leavy, P. (2022). <i>Research Design: Quantitative, Qualitative, Mixed Methods, Arts-Based, And Community-Based Participatory Research Approaches</i>, 2nd Edition. Guilford Press.London. 4. Merriam, S. B., & Tisdell, E. J. (2020). <i>Qualitative research: A guide to design and implementation</i>. 5th edition. John Wiley & Sons. 5. Alasuutari, P., & Qadir, A. (2023). <i>Introduction to Research Methods: A Beginner's Guide To Quantitative, Qualitative, And Mixed Methods Research</i>. Routledge.London. 6. Creswell, J. W., & Guetterman, T. C. (2018). <i>Educational Research: Planning, Conducting, and Evaluating Quantitative And Qualitative Research</i>, 6th Edition. Pearson. Publications. 7. Merriam, S. B., & Tisdell, E. J. (2015). <i>Qualitative research: A guide to design and implementation</i>. John Wiley & Sons. 					
ASSESSMENT					

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on activities, short tests, projects, practicals, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, fieldwork , report writing etc.