

BY600 Research Methodology

Course number	: BY600
Course Name	: Research Methodology
Credit Distribution	: 1-0-0-1
Intended for	: Masters and PhD candidates
Prerequisite	: NA
Mutual Exclusion	: NA

1. Preamble:

This course is designed to introduce fundamental principles and important aspects of scientific research. Mainly this course provides a broad knowledge on methods of research, data analysis, report writing, presentation, protecting intellectual property and ethical practices. After completion of this course, the students will be able to understand research methods, develop the skills of writing of research reports, develop ethical practices in research, and discuss research information within the scientific community and society.

Course modules (14 total hours):

1. What is research

The concept and objectives of research, types of research, research hypothesis.

2. Research planning or experimental design

Necessity to define research problem, research gap, working hypothesis, planning process, research design.

3. Lab and biosafety

Safe laboratory practices, biosafety levels, biological hazard information, labels, signs and storage of chemical and biological reagents, Classes and types of biosafety cabinets, inactivation and disposal of biological products, waste management, and incident response, report and risk management.

4. Data collection and analysis

Basics of statistics, data processing and analysis strategies and tools, hypothesis testing, interpretation of data.

5. Literature search, collection, storage and citation

Importance of literature review in defining a problem, literature review, online tools.

6. Writing research reports

Types of reports (articles, reviews, progress reports and thesis), formats, planning of report writing. Figure preparation and manipulation. Effective use of English language in scientific papers.

7. Science journals and the peer-review process

Types of journals, publication process, peer-review process, meaning of impact factor, H-index, etc.

8. Presentation skills

Preparation of slides for talks, preparation of posters. Presentation types and skills.

9. Research ethics

Ethical issues, citation and acknowledgement, plagiarism, reproducibility and accountability.

10. IPR

Intellectual property rights and patent law, commercialization, copy right, trademarks, royalty, trade related aspects of intellectual property rights and a few case studies.

11. Science popularization and outreach

Media coverage, lectures in public forums, circulation of scientific ideas and provoking thoughts, and the pros abs cons of these activities.

References:

- The Craft of Research. 4th edition by Wyne C. Booth, Colomb, William, University of Chicago Press.

- Doing Your Research Project. A Guide for First-time Researchers. By Judith Bell, Stephen Waters, publishers: McGraw-Hill Education (2014).
- Research Methodology: A Step-By-Step Guide For Beginners, by Ranjit Kumar, Publisher: Sage South Asia (2011).
- Research Methodology: Methods and Techniques, by C. R Kothari, Publisher: New Age International (2004).
- The Dissertation Journey, by Laura Hyatt, Carol Roberts, Publisher: Corwin (2023).
- How to Write a Scientific Paper: An Academic Self-Help Guide for PhD Students, by Jari Saramaki (2018).
- WIPO Intellectual Property Handbook (Web resources).
- The WHO Laboratory Biosafety Manual (LBM), 4th edition (online).

