

Syllabus

First Semester Courses in

MSc-Biotechnology

2023-2024

Contents:

- Syllabus for Research Methodology
 - PSBTY6001RM1 Introduction to Research Methods
- Evaluation and Assessment guidelines

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#MSc. Part I. Biotechnology Semester I

Course Code: PSBTY6001RM1

Name of the course: Introduction to Research Methods

Credits: 4 (3 Theory and 1 Practical)

Course Objectives:

- To learn fundamental methods and approaches in scientific research.
- To develop an understanding of logical, philosophical and quantitative underpinnings of the scientific method.
- To train and orient students towards various components of scientific research such as philosophy of science, research ethics, review of literature, problem definition, research design, data collection, data analysis and dissemination of scientific findings.

Course Outcomes (COs)

Course Title and Code	Introduction to Research Methods	PSBTY6001RM1	
CO No.	<i>On completion of the course, the student will be able to</i>	PSOs Addressed	Cognitive Level
CO-1	Understand methodological naturalism and the general conceptual process of scientific inquiry. Think critically about scientific questions, generating and evaluating evidence.	PSO-4,6,8	U, Ap, An
CO-1	Read scientific literature and utilize various modalities of scientific communication effectively.	PSO-2,3,7	U, Ap
CO-2	Will learn the best practice for recording experimental procedures and outcomes in a lab record book in an ethical manner.	PSO-2,3,4,7	U, Ap, E
CO-3	Recognise the importance of statistical thinking and approach to problem-solving across biological studies	PSO-1,3,6,7	U, An, Ap
CO-4	Apply statistical methods for scientific research.	PSO-3,4,6,7	U, An, Ap
CO-5	Create statistically relevant research designs.	PSO-2,3,4,7	U, An, Ap
CO-6	Critically analyse and interpret the data obtained through their own research	PSO-3,4,7	U, An, Ap

CONTENT**Unit 1: Understanding Scientific Research and Literature****15 lectures**

- Philosophy of Scientific Inquiry: Francis Bacon and Fundamentals of scientific method. Inductive and Deductive approaches to evidence generation and enquiry.
- Understanding research purpose and formulating research questions

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- Understanding Scientific Literature: Reading scientific literature, understanding the components and formats of a research article, essay, scientific report, research proposal and other scientific communications. Types of literature review (Argumentative, integrative, methodological, theoretical review).
- Collection of Data: Methods of data collection, empirical data recording, Ethics of data collection
- Reporting of data: recording and analysis. Interpreting the data.
- Summarising the finding: Differentiating between Abstract/Summary, results/discussion, and conclusions.
- Research Ethics: Understanding Plagiarism, Types of plagiarism, Software and web tools used to detect plagiarism.

Unit 2: Introduction to Biostatistics

15 lectures

- Measure of central tendency (mean, median and mode)
- Measure of dispersion (Standard deviation, variance, and coefficient of variance)
- Z- test (one mean, two means and paired)
- t-Test (one mean, two mean, paired and Cochran's)
- χ^2 test (test of homogeneity, Independence Goodness of fit)
- P- value for all tests (Reading tables)
- Regression
- ANOVA

Unit 3: Applied Biostatistics

15 lectures

- Statistical Experimentation: Introduction, test, control
- Experimental design and terms
- Theory of probability, density function (Estimation etc.)
- The standard Normal distribution
- Hypothesis Testing: step, errors
- Non-parametric tests: Sign, Wilcoxon, and Mann- Whitney test
- Use of R programme

Unit 4: Scientific Communication (Practical Component)

30 Hours

- General features of creative writing and composing paragraphs-central idea, flow and closing.
- Ideating and developing technical vocabulary, Developing mind maps for scientific literature
- Reference and Citation styles
- Use of info graphics (tables, graphs, charts, and figures)
- Databases and Tools for literature search and reference management
- Presentation formats and Tools for various academic communications– Posters, Presentations, Reports, Journals, News article etc
- Ethics in Scientific Writing and Plagiarism

REFERENCES:

1. C.R. Kothari, (2004) Research methodology: methods and techniques, 2nd edition, New Age International Publishers,
2. Jane Bottomley (2021), Academic Writing for International Students of Science, 2nd Ed, Routledge Publications
3. James Morris, (2007) A students guide to writing in the life sciences, The President and Fellows of Harvard University,
4. Wayne W Daniel (1999), Biostatistics: a foundation for analysis in health sciences, John Wiley and sons
5. Zar J. H. (2014), Biostatistical Analysis, 5th ed., Pearson India education services, India.
6. Online resources

Evaluation (Theory): Total marks per course – 100

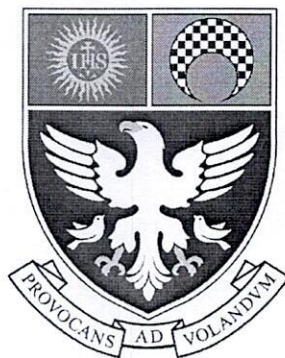
- I. Formative Assessment ‘for’ Learning (continuous internal assessment - CIA to improve learning).
CIA- 40 marks
 CIA 1: Test on Biostatistics -20 marks
 CIA 2: Scientific communication-based activity -20 marks

- II. Summative Assessment ‘of’ Learning (focus on outcomes, quantitative data for outcomes of instruction).
End Semester Examination – 60 marks

Eg: Template for the Core course End Semester examination in Semester 1 for the Research Methodology course

UNITS	KNOWLEDGE	UNDERSTANDING	APPLICATION and ANALYSES	TOTAL MARKS- Per unit
1, 4		15	15	30
2	5	5	5	15
3		8	7	15
-TOTAL - Per objective		28	27	60
% WEIGHTAGE	8.33	46.67	45	100

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Syllabus

Second Semester Courses in

MSc-Biotechnology

2023-2024

Contents:

Syllabus for Field Project/ On the Job Internship

- PSBTY6001OJ1 ON JOB INTERNSHIP
- Evaluation and Assessment guidelines



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#.Msc. Part I. Biotechnology Semester II

Course code: PSBTY6001OJ1

Name of the course: On Job Internship

Credits: 4

Course objectives:

- The period of internship will help the learner Gain insights into the biotech industry landscape, trends, and market dynamics.
- It will provide an opportunity to the learner to understand how projects are managed within the biotech industry, including milestones and deliverables.
- It will help the learner gain insights into potential career paths within the biotech industry and reflect on the experience to inform future career choices and professional development goals.

Course outcomes (CO):

Course Title and Code	On Job Internship	PSBTY6001OJ1	
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CO-1	Understand methodological naturalism and the general conceptual process of scientific inquiry. Think critically about scientific questions, generating and evaluating evidence.	PSO-4,6,8	U,Ap, An
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CONTENT

On job internship at research institutes-labs/ diagnostic labs/ hospitals/ R and D labs/ Market research firms for Biotech products/IPR or Law firms/ etc

Duration : mid-April – mid June 2024 (two months)

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Evaluation

- I. Summative Assessment 'of' Learning (focus on outcomes, quantitative data for outcomes of instruction).

End Semester Examination – 100 Marks

Report Submission, Certification from the interning organisation, Supervisor's evaluation, Viva-voce

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