Resolution No. AC/II(22-23).3.RPS2

S. P. Mandali's

Ramnarain Ruia Autonomous College

(Affiliated to University of Mumbai)

Syllabus for

Program: MSc Part I

Program Code: RPSBCH

(As per the guidelines of National Education Policy 2020-Academic year 2023-24)

RAMNARAIN RUIA AUTONOMOUS COLLEGE

GRADUATE ATTRIBUTES

S. P. Mandali's Ramnarain Ruia Autonomous College has adopted the Outcome Based Education model to make its science graduates globally competent and capable of advancing in their careers. The Bachelors Program in Science also encourages students to reflect on the broader purpose of their education.

GA	GA Description **A student completing Master's Degree in Science program will be able to:**
GA 1	Demonstrate in depth understanding in the relevant science discipline. Recall, explain, extrapolate, and organize conceptual scientific knowledge for execution and application and also to evaluate its relevance.
GA 2	Critically evaluate, analyse, and comprehend a scientific problem. Think creatively, experiment and generate a solution independently, check and validate it and modify if necessary.
GA 3	Access, evaluate, understand, and compare digital information from various sources and apply it for scientific knowledge acquisition as well as scientific data analysis and presentation.
GA 4	Articulate scientific ideas, put forth a hypothesis, design and execute testing tools and draw relevant inferences. Communicate the research work in appropriate scientific language.
GA 5	Demonstrate initiative, competence, and tenacity at the workplace. Successfully plan and execute tasks independently as well as with team members. Effectively communicate and present complex information accurately and appropriately to different groups.
GA 6	Use an objective, unbiased and non-manipulative approach in collection and interpretation of scientific data and avoid plagiarism and violation of Intellectual Property Rights. Appreciate and be sensitive to environmental and sustainability issues and understand its scientific significance and global relevance.
GA 7	Translate academic research into innovation and creatively design scientific solutions to problems. Exemplify project plans, use management skills, and lead a team for planning and execution of a task.
GA 8	Understand cross disciplinary relevance of scientific developments and relearn and reskill so as to adapt to technological advancements.

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PROGRAM OUTCOMES

PO	Description **A student completing Master's Degree in Science program in the subject of Biochemistry will be able to:**
PO 1	Acquire necessary knowledge and skills to undertake a career in research, either in industry or in an academic set up.
PO 2	Compare and contrast the breadth and depth of scientific knowledge in the broad range of fields including Protein biochemistry, Bioenergetics, Diagnostic Biochemistry, Hormonal Biochemistry, Molecular Biology, Nutritional Biochemistry, and Nanotechnology.
PO 3	Extrapolate and comprehend the regulatory role of metabolic processes and understand the underlying cause of metabolic disorders
PO 4	Acquire thorough knowledge of Biochemical Techniques, Advanced Immunology, Physiology, Genetic Engineering, and Biotechnology
PO 5	Describe and express the biochemical basis of human diseases, protein structure and conformation, non-invasive diagnostics, clinical research, and its importance in drug development. Usage of this knowledge further for multitude of laboratory applications.
PO 6	Integrate and apply the techniques in Biophysics, Analytical Biochemistry, Clinical biochemistry, Microbiology, Molecular Biology and Basics in Bioinformatics
PO 7	Gain proficiency in laboratory techniques in both Biochemistry and Molecular Biology, and be able to apply the scientific method to the processes of experimentation and Hypothesis testing
PO 8	Develop and enhance skills & improve employability through academic, research and internship opportunities
PO 9	Gain exposure to basic research through the provision of PG research based project.
PO 10	Learn to work as a team as well as independently to compile and interpret Biological data, carry out Research investigations and draw conclusions

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CREDIT STRUCTURE MSc

Semester	Mandatory	Elective	RM	OJT/FP	RP/ Internship	Cum.Credits
1	14 (3+1)*3+2	4(3+1)	4	0	0	22
2	14 (3+1)*3+2	4(3+1)	0	4 FP	0	22

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Semester I

Course Code: RPSRMBCH.O505

Course Title: Research Methodology

Type of course: Research Methodology

Academic year 2023-24

COURSE OUTCOMES:

COURSE OUTCOME	DESCRIPTION A student completing this course will be able to:
CO 1	Choose appropriate methods to know aims and objectives of research
CO 2	Design hypothesis and methodology to conduct research
CO 3	Identify various limitations of particular research methods
CO 4	Make essential documents for literature survey and report writing
CO 5	Develop skills in qualitative and quantitative data analysis and presentation
CO 6	Improve scientific writing skills and develop advanced critical thinking skills to draft a research paper
CO 7	Analyze and comprehend the ethical practices in conducting research and dissemination of results in different forms
CO 8	Evaluate research, and address ethical and practical dilemmas

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DETAILED SYLLABUS

Course Code	Unit	Course/ Unit Title Research Methodology RPSRMBCH.O505	Credits/ Hours 4 / 60 Hours
I	**1**	**Fundamentals of Research**	**15**
	1.1	Meaning and Objective of research	
	1.2	Types of research- basic, applied & patent oriented	
	1.3	Defining research problem	
	1.4	Research process and steps involved	
	1.5	Research proposal or synopsis	
II	**2**	**Literature Survey & Documentation**	**15**
	2.1	literature survey	
	2.1.1	Methods of literature survey	
	2.1.1	Use of library, Books, journals, e-journals, thesis, chemical abstracts and patent database	
	2.2	Documentation	
	2.2.1	Importance of documentation	
	2.2.2	Documentation techniques- use of computer programs, packages (Online resources such as scientific search engines and online servers)	
III	**3**	**Technical Writing and Reporting of Research**	**15**
	3.1	Types of research report	
	3.1.1	Dissertation & Thesis, research paper, Review article, short communications, conference presentation, meeting report	
	3.2	Structure and organization of research report	
	3.2.1	Titles, abstracts, key words, introduction, methodology, result, discussion, conclusion, acknowledgement, references, footnotes, tables and illustrations	
	3.3	Styles of referencing, use of references managing software, Impact factor, rating, indexing and citation of journals	
IV	**4**	**Research Ethics & Scientific Misconduct**	**15**
	4.1	Research Ethics, responsibility and accountability of the researcher	
	4.2	Ethical consideration during animal experimentation	
	4.3	Classification of scientific Misconduct	
	4.3.1	Fabrication of data	
	4.3.2	Falsification	
	4.3.3	Plagiarism and use of detection software	

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	4.4	Consequences of scientific misconduct	
	4.5	Measures to maintain research ethic and avoid scientific misconduct Measures to maintain research ethics and avoid scientific misconduct	
	4.6	Methods to prevent academic research misconduct Predatory journals and salami splicing	

References:

1) Research Methodology methods and techniques, Second Revised Edition, C.R.Kothari (New Age International Publishers)
2) Bhattacharya, D. K. (2003): Research Methodology, Excel Books, New Delhi
3) Research Methods Lippinott Company, U.K
4) Bioinformatics methods and applications, Genomics, Proteomics and drug discovery, Fourth Edition, S.C.Rastogi
5) Introduction to Bioinformatics in Microbiology. Henrik Christensen, Springer International Publishing (2018)
6) Introduction to Bioinformatics. Arthur Lesk, Oxford University Press (2013)

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Modality of Assessment: Semester I

RM

A) Internal Assessment- 40%- 30 Marks

Sr No	Evaluation type	Marks
1	Class test / Scientific Writing Assignment (Abstract / Research Article)	20
2	Research Review / Research Proposal Writing	20
	TOTAL	**40**

Semester End Theory Examination:

1. Duration - These examinations shall be of **Two hours & 30 Minutes** duration.
2. Theory question paper pattern:

Paper Pattern:

Question	Options	Marks	Questions Based on
Q1.	Any 3 out of 4	15	UNIT I
Q2.	Any 3 out of 4	15	UNIT II
Q3.	Any 3 out of 4	15	UNIT III
Q4.	Any 3 out of 4	15	UNIT IV
	TOTAL	**60**	

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