

ಮಂಗಳೂರು  
MANGALORE



ವಿಶ್ವವಿದ್ಯಾನಿಲಯ  
UNIVERSITY

(Accredited by NAAC)

ಕ್ರಮಾಂಕ/ No. : MU/ACC/CR 67/2020-21/A2

ಕುಲಸಚಿವರ ಕಛೇರಿ

ಮಂಗಳಗಂಗೋತ್ರಿ - 574 199

Office of the Registrar

Mangalagangothri - 574 199

ದಿನಾಂಕ/Date:25.11.2021

### NOTIFICATION

Sub: Revised syllabus for Ph.D. Coursework in Biochemistry  
Ref: Academic Council approval vide agenda  
No.: ಎಸಿಸಿ:ಶೈ.ಸಾ.ಸ.2: 18(2021-22) dated 27.10.2021

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The revised syllabus for Ph.D. Coursework in Biochemistry which has been approved by the Academic Council at its meeting held on 27.10.2021 is hereby notified for implementation with effect from the academic year 2021-22.

  
REGISTRAR

To,

1. The Co-ordinator, Dept. of Biochemistry, Jnana Kaveri, P.G. Centre Chikka Aluvara, Kodagu.
2. The Chairman, BOS in Biochemistry, Jnana Kaveri, P.G. Centre Chikka Aluvara, Kodagu.
3. The Registrar (Evaluation), Mangalore University.
4. The Superintendent (ACC), O/o the Registrar, Mangalore University.
5. The Asst. Registrar (ACC), O/o the Registrar, Mangalore University.
6. The Director, DUIMS, Mangalore University – with a request to publish in the website.
7. Guard File.

Mangalore University

Department of Biochemistry

Scheme of Examination for Ph.D. Course work

Course	Particulars	Hours of Instruction per week	Durations of Exam (hrs.)	Marks		
				IA	Theory	Total
BC 601	Research Methodology	4	3	30	70	100
BC 602	Research and Publication Ethics (RPE)	2	3	30	70	100
BC 603	Review of Literature	14	-	-	-	150
	Review report Viva		-	-	-	50
				Total	Total	400
						14

**MANGALORE UNIVERSITY**  
**DEPARTMENT OF BIOCHEMISTRY, CHIKKA ALUVARA**

**Ph.D. COURSE WORK SYLLABUS**

**BC 601: RESEARCH METHODOLOGY**

**RM 01: RESEARCH METHODOLOGY**

**14Hours**

Research processes - Scientific research, formation of the topic, hypothesis, Sources of information. Types and Methods of Research - Classification of Research - Pure and Applied Research - Exploring or Formulative Research - Descriptive Research - Diagnostic research study - Evaluation research/Studies - Action Research - Experimental Research. Research design and methods - Basic Principles. Need of research design, important concepts relating to research design — Observation and Facts, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, and Experimentation

Writing methods - Introduction, word processing and layout, writing and formatting with the computer, writing the first draft, revising the first draft on content and structure, revising the second draft on style, writing a thesis, writing review article and book reviews, preparing research proposals for grants. Collection and Citation of Literature: Acquisition of information, building up of own literature collection, anatomy of source description. Digital - Web resources — e-Journal — Journal access — TOC alerts — Hot articles — Citation index — Impact factor — h-Index — e-Consortium — UGC info net — e-Books — Internet discussion groups and communities — Blogs — Preprint server — Search engines, Scirus, Google Scholar, Chemical Industry, Wiki — Databases, Chem Spider, Science Direct, SciFinder, Scopus. Familiarity with ideas and concepts of investigation.

**RM 02: Data Analysis and Sampling**

**14Hours**

Data analysis - Classification of errors - systematic errors - sources, Random errors - sources and distribution. Accuracy and precision - Determination of accuracy of methods, improving accuracy of analysis, significant figures, mean, standard deviation, Analysis of variance (ANOVA) — Correlation and Regression, Graphical methods - Linear regression line, correlation coefficient - Multiple linear regression (one variable with two other variables). Comparison of results: "t" test and "F" test rejection of results, gathering of data, analysis of data, revising of hypothesis, presentation of data and Conclusion

**Sampling** - Introduction — definitions — theory of sampling — techniques of sampling - Representative sample, sample storage, sample pretreatment and sample preparation. Statistical criteria of good sampling and required size — stratified sampling v/s random sampling. Quality in analytical laboratories - quality control and quality assurance, accreditation system

**RM 03: Safety Aspects and Ethics in Research**

**14Hours**

General safety and operational rules - Safety equipments, personal protective equipments, compressed gas safety, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, incineration and transportation of hazardous chemicals. Emergency response - Chemical spills, radiation spills, biohazard spills, leaking compressed gas cylinders, fires, medical emergency accident reporting. Safety rules of laboratory acquaintance of experimental set up and instruments, intellectual property and intellectual property rights. Data management, importance of safety and security of data, evaluation of inventions. Communication with patent council and publication of data, communication with investors, IP sales process. Application of results and ethics - Environmental impacts - Ethical issues - ethical committees - Commercialization — Copy right — Royalty - Intellectual property rights and patent law — Trade Related

aspects of Intellectual Property Rights — Reproduction of published material — Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

**RM 04: Biochemical Techniques**

**14 Hours**

Protein and nucleic acid purification and characterization techniques-Fractionation techniques (salt, solvent, pH and temperature), chromatographic techniques (ion exchange, gel filtration, affinity chromatography, HPLC and FPLC), Electrophoretic techniques (Native PAGE, SDS-PAGE, IEF, Agarose gel electrophoresis) spectroscopic techniques ( UV- Visible spectroscopy, IR, NMR, ESR, CD, ORD, MALDI-TOF and LC-MS) and blotting techniques.

**Reference Books:**

1. C.R. Kothari, Research Methodology: Methods and Techniques. New Age International, 1990.
2. D.R. Kapoor & Pooja Saigal, Research Methodology Methods & Techniques, Regal Publications, 2013.
3. D. K. Bhattacharya, Research Methodology Pillappa; Third edition, 2013
4. Suresh Chandra & Mohit K Sharma, Research Methodology, Alpha Science Intl Ltd; 1<sup>st</sup> edition, 2013.
5. R. Panneerselvam, Research Methodology, Phi Learning publication, 2009.
6. Nicholas Walliman, Research Methodology, 2010.
7. P.M. Silverstein, F.X. Wester, Spectroscopic Identification of Organic Compounds, 6<sup>th</sup> Ed., Wiley 1998.
8. Douglas A. Skoog, Donald M. West, F. James Holler, Fundamentals of analytical Chemistry, Saunders College Pub., 1988.
9. SM Khopkar Basic Concepts of Analytical Chemistry New Age International, 1998
10. Gupta R. N. Chemical warfare and causality Management 2011.
11. Vyas M N. Safety and hazards management in chemical industries 2013. Atlantic Publication
12. Dikshith T. S. Safety evaluation of environmental chemicals. New Age International 1996.
13. Chemical Safety Matters-IUPAC —-IPCS, Cambridge Univ. Press, 1992.
14. Fundamentals of Research Methodology and Statistics, Yogesh Kumar Singh, New Age International Publishers, 2006

**BC 602 RESEARCH AND PUBLICATION ETHICS**

**RPE 01: PHILOSOPHY AND ETHICS**

**(4 hrs)**

1. Introduction to philosophy: definition nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

**RPE 02: SCIENTIFIC CONDUCT**

**(4 hrs)**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data.

**RPE 03: PUBLICATION ETHICS**

**(7 hrs)**

1. Publication ethics: definition, introduction and importance
2. Best practices/ standards setting initiatives and guidelines: COPE, WAME, etc.,
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals

7. Predatory publishers and journals.

## PRACTICE

### RPE 04: OPEN ACCESS PUBLISHING

(4hrs)

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder/ journal suggestion tools viz. JANE, Elsevier journal finder, Springer journal Suggester, etc.

### RPE 05: PUBLICATION MISCONDUCT

(4hrs)

#### A: Group Discussions

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

#### B: Software tools

Use of plagiarism software like Turnitin, Urkund and other open source software tools

### RPE 06: DATA BASES AND RESEARCH METRICS

(7 hrs)

#### A. Databases (4 hrs)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

#### B. Research Metrics (3 hrs)

1. Impact Factor of journal as per journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics.

#### References:

1. Bird, A.(2006). Philosophy of Science. Routledge.
2. MacIntyre, Alasdair (1967) a Short History of Ethics. London.
3. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped: do not get plagiarized, ISBN: 978-9387480865
4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A guide to Responsible conduct in research: third edition. National academics press.
5. Resnik, D.B. (2011). What is ethics in research & why is it important. National institute of environmental Health Sciences, 1-10. Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
6. Beall, J. (2012).Predatory publishers are corrupting open access. Nature, 489(7415), 179-179.<https://doi.org/10.1038/489179a>
7. Indian national Science Academy (INSA), Ethics in science education, Research and Governance (2019), ISBN:978-81-939482-1-7. <http://www.insaindia.res.in/pdf/ethics> Book. Pdf

### BC 603: RIVIEW OF LITERATURE

- This will be prepared by the research student in consultation with research supervisor which include state of the art research work analysis, related implementation issues and motivation for the stated research work.

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