SYLLABUS

Ph.D. BIOTECHNOLOGY

DEPARTMENT OF BIOTECHNOLOGY
SCHOOL OF LIFE SCIENCES
PONDICHERRY UNIVERSITY

DEPARTMENT OF BIOTECHNOLOGY
PONDICHERRY UNIVERSITY

Ph. D. IN BIOTECHNOLOGY

COURSE CONTENT AND SYLLABUS

Pre Ph. D

Paper I - Research Methodology

Paper II - (To be conducted by the Supervisor)

PAPER – I: RESEARCH METHODOLOGY

Unit I:

Microscopy: Simple, Compound, Fluorescent and Electron Microscope Principles – different types of objectives, oculars and condensers, Numerical aperture, Resolving power. Principle and applications of Confocal Microscopy. Microbiology: Staining, Plating, Isolation and preservation of microbes. Identification of Bacteria.

Unit II:

Colorimetry and Spectrometry: Beer-Lamberts Law, Fundamentals of Colorimetry and Spectrophotometry, UV and Visible Spectrophotometer, Principles and Applications of CD spectropolarimeter and NMR.

Unit III:

Centrifugation: Principles, Types of centrifuges, rotors and applications. Chromatography: Types-Principles and applications. Principle and methodology of the analytical ultracentrifuge. Determination of molecular weight by sedimentation velocity method, separation of cell organelles.

Unit IV:

Electrophoresis: Nucleic acids and proteins – Principles- Types- 2D and Pulse field gel electrophoresis, applications. Isolation and characterization of Plasmids, size determination, elution techniques. Cloning of *E. coli, Bacillus* and *Pseudomonas*. Selection of recombinants, Northern and Southern Blotting techniques. Immunization procedures, Purification of antibodies, ELISA, Immunoblotting, Immunoelectrophoresis, Principles and applications of Flow Cytometry

Unit V:

Radio tracer techniques: principles of using ^{3}H, ^{14}C, ^{32}P, ^{35}S, ^{125}I, ^{14}N, ^{15}N- radioactivity measurement techniques of liquids and solid samples- α, β and γ rays- autoradiography. Multile Sequence Alignment, Dendrograms, Student t test, Chi square, analysis of variance, correlation and regressions.

Unit VI:

Biological safety and bioethics of recombinant DNA technology. Handling of genetically modified microbes, plants and animals. Safety issues in transgenic plants, Intellectual property rights (IPR), copy rights, trademarks and patents.

References:

1. Molecular Cloning: A Laboratory Manual, 2012, Fourth edition, Cold Spring Harbor Laboratory Press. Editors: Sambrook J et al.
2. Practical Biochemistry Principles and Techniques, Fifth Edition, Cambridge University Press. Editors: Wilson, K. and Walker, J.

ज्ञान-विज्ञान विमुक्तये

प्रो. रजनीश जैन
सचिव
Prof. Rajnish Jain
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
(Ministry of Human Resource Development, Govt. of India)
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D.O.No.F.1-1/2018(Journal/CARE)

December, 2019

Respected Sir/Madam,

University Grants Commission in its 543rd meeting held on 9th August, 2019 approved two Credit Courses for awareness about publication ethics and publication misconducts entitled **"Research and Publication Ethics (RPE)"** to be made compulsory for all Ph.D. students for pre-registration course work (**attached as Annexure**).

In view of the above, you are requested to ensure that the above two Credit courses may be made compulsory for all Ph.D. students for pre-registration course work undertaken in your University from the forthcoming academic session.

With regards,

Yours sincerely,

(Rajnish Jain)

TO THE VICE-CHANCELLORS OF ALL UNIVERSITIES

ANNEXURE

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	**30**

Syllabus in detail

THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**

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

- **RPE 02: SCIENTIFICCONDUCT (5hrs.)**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, 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 behavior 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(4 hrs.)**

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 (2 hrs.)

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 (2 hrs.)

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

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

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

Bird, A. (2006). *Philosophy of Science*. Routledge.

MacIntyre, Alasdair (1967) *A Short History of Ethics*. London.

P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865

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 Academies Press.

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

Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179–179. https://doi.org/10.1038/489179a

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