M.Phil/Ph.D Syllabus 2020
School of Life Sciences, AUS
University Level Paper – 501
(Common paper for Biotechnology/Microbiology/Life Science and Bioinformatics)
Total Marks: 100; Credits: 02

Paper title: RESEARCH AND PUBLICATION ETHICS (RPE)

THEORY

UNIT 1: 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.

UNIT 2: SCIENTIFIC CONDUCT (5 HRS)

1. Ethics with respect to science and research
2. Intellectual honest and research integrity
3. Scientific misconducts: falsification, fabrication, and plagiarism.
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data.

UNIT 3: 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 verse, types
5. Violation of publication ethics, authorship and contributor ship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

UNIT 4: OPEN ACCESS PUBLISHING (4 HRS)

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright and 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 Suggested, etc.

Unit 5: PUBLICATION MISCONDUCT (4 HRS)

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.

Unit 6: DATABASES 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)

Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score.
Metrics: h-index, g index, i10 index, altmetrics

M.Phil/Ph.D Syllabus 2020
School of Life Sciences, AUS
Course Title: Research methodology
Paper – 502 (School Level)
(Common paper for Biotechnology/Microbiology/Life Science and Bioinformatics)
Total Marks: 100
Credits: 04

UNIT 1

1. Statement of research problem, formation of objectives, types of research-basic and applied.
2. Formulation of hypothesis and design of experiments.
3. Review of literature, basic concepts.
4. Laws and theories related to research problem.

UNIT 2

1. Intellectual Property Rights (IPR) issues and Biosafety.
2. Ethics in Science and Technology, Plagiarism.
3. Impact of research on environment; Benefits of research to human community.
4. Preparation of research proposal, report and scientific paper.

UNIT 3

1. Introduction to databases (Pubmed) for literature.
2. Application of MS-office in research, Data analysis using MS-Excel.
3. Softwares: Mendeley, End note for references, Plagiarism detection tools.
4. Power Point presentations and Software for Graphics.

UNIT 4

1. Applications of statistics in research, measures of central tendency (mean, mode, median), measures of dispersion (standard deviation, variance, coefficient of variation).
2. Levels of significance in biological data analysis and their interpretations.
3. Formulation of hypothesis, type I and type II errors, parametric and nonparametric tests, simple correlation and regression analysis.
4. Tests of significance, chi-square test, t-tests and their applications, using software for statistical analysis.

M.Phil/Ph.D Syllabus 2020
Department of Biotechnology, AUS
Biotechnology Departmental Level Paper – 503
(Paper for Biotechnology)
Total Marks: 100
Credits: 04

METHODOLOGY

UNIT 1

1. Principles and applications of spectrophotometry & NMR.
2. Principles and applications of Chromatography, GC-MS.
3. Principles and applications of PCR, DNA sequencing.
4. Principles and applications of flow cytometer.
5. Gene cloning- vectors, restriction endonucleases, Genetically Modified Organisms (GMOs), Genetically Modified Microorganisms (GMMs) and their applications.

UNIT 2

1. DNA markers and their applications. Biotechnological approaches for disease diagnosis.
2. Plant transgenesis and tissue culture, transgenesis in animals
3. Metagenomics, Bioremediation and applications of biotechnology in controlling climate change.
4. Identification of bacteria on the basis of ribosomal gene sequence analysis. Assessment of microbial diversity by molecular techniques.
5. Biodegradation of recalcitrant compounds (lignin- pesticides), bioinoculants-biopesticides and bioinsecticides.

RESEARCH AREA SPECIFIC

UNIT 3

1. Scientific databases and retrieval of data: Nucleotide databases, protein databases and literature databases.
2. Tools for alignment of nucleotide and protein sequences- local alignment and multiple alignment.
3. Writing of Research Proposal, Report and Research Paper: Meaning and types - Stages in preparation - Characteristics - Structure - Footnotes and Bibliography- use of Endnote. Checklist for a good proposal/report/research paper. Ethical, legal, social and scientific issues in Biological Research. IPR, patents and Biosafety.
4. Principles and applications of Atomic absorption spectrophotometry, Flow cytometry, Western blotting, ELISA, PAGE, SDS-PAGE, Agarose gel electrophoresis, 2D-gel electrophoresis, microarray analysis, mass spectrometry.
5. Isolation and purification of DNA. Commonly used vectors for gene-cloning, DNA manipulating enzymes, construction of genomic and cDNA libraries. Applications of Quantitative Real Time PCR

UNIT 4

1. Introduction to applications of statistics in biology.
2. Measures of dispersion, Simple correlation and Regression analysis.
3. Tests of significance; F-test, paired t-test and unpaired t-test, Chi-square test and its applications.
4. Analysis of variance (ANOVA)
5. Design of experiments (CRD and RBD designs) for Biotechnology.

M.Phil/Ph.D Syllabus 2020
Department of Biotechnology, AUS
Biotechnology Term Paper – 504
(Paper for Biotechnology)
Total Marks: 100
Credits: 06

Term paper is to be assigned in the beginning of the semester to each Ph.D/MPhil student for its submission to the department. The paper may include preparation of Protocol, Review of Literature, Methodology or any relevant topic of Research.

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