Department of Environmental Science &Engg.
Guru Jambheshwar University of Science & Technology, Hisar

Syllabus for Pre-Ph.D Course Work (Environmental Science & Engg.)

Scheme of Examination for Pre- Ph.D Programme in Environmental Science & Engg.)

Sr.No.	Course Code No.	Nomenclature	Type	L + T + P	Credits	Max. Marks
1.	PPD- 101	Research Methodology	PC	4 + 0 + 0	4	100
2.	PPD- 102	Review of Literature and Seminar	PC	2 + 0 + 0	2	100
3.	PPD- 103	Departmental Elective Course	PE	4 + 0 + 0	4	100
4.	PPD-104	Research and Publication Ethics (RPE)	PC	2+0+0	2	100

PPD-101 Research Methodology

Unit 1

Introduction to Research Methodology : Meaning, Objectives, Types and Significance of research, Creativity and Innovation, Hypothesis formulation and development of Research plan.

Research problem: Definition, necessity and techniques of defining the research problem.

Use of modern aids: Making technical presentation, Research and academic integrity Avoiding plagiarism using software. Copyright issues, ethics in research, Intellectual

Property Rights (IPRs) & patent Law.

Unit 2

Scientific Communications: Role and importance of communications, Effective oral and Written Communication, Scientific and Research paper writing, Technical report writing.

Making Research & Development (R&D) proposals.

Publishing Research paper: Selection of journal, formulation of problem, discussion and references, Submission and handling of reviewers comments.

Writing of thesis: Format of thesis, Review of literature, Formulation: Writing methods result, preparation of tables, figures; writing discussion: writing conclusion Writing summary and synopsis; Reference citing and listing/Bibliography. Safety, safe disposal of hazardous materials.

Laboratory safety issues: Related to various labs, Workshop, electrical, health and fire.

Unit 3

Statistical analysis and errors: Mean, Mode, Median, Relative and Hypothesis testing for mean, proportion and variance. Chi-square tests, regression analysis, Factor analysis.

Linear and non-linear least squares fitting methods, Interpolation methods including cubic splines, Fourier series Analysis, Fast Fourier Transform, Convolution and Correlation.

Unit 4

Computational tools and programming: Resume of practical approach of learning operating systems (DOS, Windows, UNIX), Graphical packages, Calculations using Spreadsheet programming. Technical research paper writing in Latex. Introduction to HTML, XML & programming languages, an overview of Modeling and simulation software's

Online Resources: Introduction to Massive Open Online Courses (MOOCs) and

Study webs of Active-Learning for Young Aspiring Minds (SWAYAM), Indexing and abstracting services, Citation index and impact factor, Research quality parameters and indicators.

References

1. Gurumani, N. (2010), Scientific thesis writing and Paper presentation, MJP publishers.
2. Gerald, C. F. and wneatley, P. O. (2002) Applid numerical analysis, 6th Ed, Addison Wesley.
3. Smith G. D., (1982) Numerical solution of partial differential equation, Oxford University press.
4. Schwartz H. R., Rutishauser H. Stiefel E. et al (1976) Numerical analysis of symmetric matrices, Prentic Hall.
5. C. R. Kothari & Gaurav Garg (2014), Reseach Methodology, Third Edition, New Age International publishers.
6. Web resources: www.sciencedirect.com for journal references, www.aip.org and www.aps.org for references styles.

PPD-102 Review of Literature and Seminar

The topic of credit seminar will be decided by the Teacher incharge which will be of recent interest and the student will collect the literature and deliver the credit seminar on the above topic which will be evaluated by a minimum of 3 faculty members including Nominee of the Dean from other department

It includes discussions on research ethics, presenting a seminar on review of published research or on own published review/survey paper or training or field work done in the relevant area of research etc

PPD-103 Departmental Elective Course

Students have to choose any one subject as per their specialization:

Recent Advances in

- Bioremediation,
- Bioenergy
- Waste water management and treatment
- Environmental monitoring and impact assessment
- Solid waste management

PPD-104: Research and Publication Ethics (RPE)

- **RPE 01: PHILOSOPHY AND ETHICS**

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

- **RPE 02: SCIENTIFICCONDUCT**
    1. Ethics with respect to science and research
    2. Intellectual honesty and research integrity
    3. Scientific misconducts: Falsifications, Fabrication, and Plagiarism (FFP)
    4. Redundant publications: duplicate and overlapping publications, salami slicing
    5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS**
    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**
    1. Open access publications and initiatives
    2. SHERPA/RoMEO online resources to check publisher copyright & self-archiving policies
    3. Software tool to identifu predatory publications developed by SPPU
    4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT**
    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 (2hrs.)

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

- **RPE 06: DATABASES AND RESEARCH MATRICS**

A. Databases(4hrs.)

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

B. Research Metrics

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