

Programme Name: PhD in Electronics

Programme Specific Outcomes of Ph.D Programme

1. Conduct high quality research and disseminate it to scholarly and other audiences;
2. Enhance the critical thinking abilities and logical reasoning.
3. Develop a holistic approach to address problems pertaining to social, economical and technological relevance
4. Improve the knowledge base of technology and to address local and global challenges through sustainable development approach
5. Impart skills of scientific writing such as technical notes, literature review, scientific articles, manuals
6. Excel in a variety of institutional settings, including universities, industry and government research labs, and think tanks

Scheme of Examination for PhD Course Work

Course	Particulars	Hours of Instruction per week	Duration of Exam (Hrs.)	Marks			
				IA	Theory	Total	Credits
Course 1	Research Methodology	4	3	30	70	100	4
Course 2	Research and Publication Ethics (RPE)	2	3	30	70	100	2
Course 3	Review of Literature	14	-	-	-	150	6
	Review report Viva		-	-	-	50	2
Total						400	14

The PhD course shall consist of

- a) A course on Research Methodology with 4 credits
- b) A course on “ Research and Publication Ethics” (RPE) with 2 credits
- c) A course on Review of literature with 6 credits

PhD Course Work
(Total Number of courses in Ph.D Course Work : 03)

Course 1: Research Methodology (4 Credits)

1. To understand the definition of formal research and to dispel the wrong notions about research.
2. To understand the central role of research problem in a research and the literature review required for the discovery of the researchable problem
3. To understand the role of Null Hypothesis and Alternate Hypothesis to arrive at the solutions to the research problem.
4. To understand the roles of different tools of research namely, library, statistics, human mind, laboratory, collaboration etc.

Unit - I

What Is Research? Exploring Research in Your Field, Browsing Periodical Section of Library, Finding Journals on Internet.

Tools of Research: Library And Its Resources, Computer And Its Software As Tool of Research, Measurement As A Tool Of Research, Human Mind As A Tool Of Research, Language As A Tool Of Research

15 Hours

Unit - II

Focusing Research Efforts: Finding A Problem, Stating A Research Problem, Evaluating A Research Problem, Identifying Sub Problems And Its Characteristics, Stating The Hypothesis of Research Question.

Review of Literature: Role of Review, Locating Related Literature, Using Library Catalogue, Indexes, Abstracts and Other References, Using Online Database, Organizing Information Collected, Evaluating and Synthesizing The Literature.

15 Hours

Unit - III

Planning A Research Proposal: Basic Format of Research, Research Planning And Methodology, General Criteria For Research Project, Role of Data in Research, Linking Data in Research Methodology, Writing Research Proposal, Strengthening Research Proposal
Preparing the Research Report: Planning Research Report, Description of Problem, Description of Method, Presentation And Interpretation of Data, Preliminary Pages And Notes, Foot Notes, Reference List, Appendix, Organizing The Research Report. **15 Hours**

Unit - IV

A detailed analytical study of programming tools techniques and instrumentation related to the area of research. (Matlab, C, C++, Workstation, Networking, Network analyzer, Microwave Devices and Circuits, SEM, TEM, X-ray analysis, Keithley Instruments, IoT set up)

15 Hours

Text Books:

1. Practical Research: Planning And Design – Paul D. Leedy And Jeanne Ellis Ormrod, 9th Edition, Pearson Publications ISBN – 978-0-13-715242-1, 2010.
2. Matlab Programming For Engineers – Stephen J Chapman, 2nd Edition Brooks/Cole Publications.

Course 2 : Research and Publication Ethics (2 Credits)

Unit – I

Philosophy and Ethics **3 Hours**

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

Scientificconduct **5 Hour**

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

Unit – II

Publication Ethics **7 Hours**

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, problem 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

Open Access Publishing **4 Hours**

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.

Unit - III

Publication Misconduct **4 Hours**

- A. Group Discussions (2 Hours)
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 Hours)
- Use of plagiarism software like Turnitin, Urkund and other open source software tools

Databases and Research Metrics **7 Hours**

- A. Databases (4 Hours)
1. Indexing databases
 2. Citation database: Web of Science, Scopus, etc.
- B. Research Metrics (3 Hours)
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, Ajasdair (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 Science, 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.
- 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/biorthics/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. https://www.insaindia.res.in/pdf/Ethics_Book.pdf



Course 3: Literature Review (6 Credits)

The Scholar shall carry out an in depth Study of research papers related to the area / topic of research and record his/her observations.

The Scholar shall periodically discuss/ present his findings of literature review to his/ her supervisor.

Finally he/she shall make a records of all papers studied and analyzed in the form of a report and submit the same for evaluation through his/her research supervisor.

Course Outcomes

1. Understand the basic research methodologies followed in similarly defined research problems
2. Critically analyzing the outcomes of previous studies in chosen domain of research
3. Understanding the importance of scientific writing to convey the outcomes to general public
4. A scientific study on challenges related to socio-economical and technical domains.
5. Organizing technical data to fit into global standards and formats.

