

D.D.U. Gorakhpur University, Gorakhpur

Department of Electronics



Pre Ph. D COURSE WORK

in

Electronics

(2024)

Department of Electronics

DDU Gorakhpur University, Gorakhpur

Faculty of Science

Pre Ph. D. Course Work in Electronics

Every student admitted to the Ph. D. program in Electronics will be required to complete a course work of 12 credits as follows:.

Course Code	Course Title	Credit
RPE-700	Research and Publication Ethics	02(1+1)
ELE 601	Research Methodology	05(5+0)
ELE 602	Innovative Research Approaches in Electronics	05(5+0)

Program Outcomes

At the end of Pre Ph.D. course work the student will be able to:

1. Produce a well-developed research proposal that addresses question of significance in a specific area of Electronics.
2. Demonstrate in-depth knowledge of a particular area in Electronics and broad knowledge of other areas in allied sciences.
3. Choose an appropriate methodology to conduct the research work.
4. Understand the most advanced research area in the field of Electronics which is selected for the purpose of undertaking research with in-depth literature survey.
5. Identify and apply the resources as well as tools needed to perform the research process.
6. Continue with the ethical standards during the entire research work.

Course Contents

Research and Publication Ethics

Course Code: RPE-700

Credits:02(1+1)

Syllabus

Unit –I (Theory) Philosophy and Ethics, Introduction to Philosophy: definition, nature, scope, concept, branches Ethics: definition, moral philosophy, nature of moral judgment and reactions. Scientific Conduct, Research ethics, research Intellectual honesty and research integrity, copyright, Scientific misconduct: falsification, fabrication, and Plagiarism (FFP), Redundant Publication: duplication and overlapping publication salami slicing, Selective reporting, and misrepresentation of data

Unit –II (Theory): Publication Ethics: definition, introduction, and importance Best practice/standard setting initiative and guidelines: COPE, WAME, etc. Conflict and interest, Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, type, Violation of publication ethics, authorship and contributor-ship, Predatory publisher and journals, Avoiding Plagiarism. Preparing documents for MoUs, Confidentiality Agreements

Unit –III (Practice) Open access publication and initiatives SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies, Software tool to identify predatory publication developed by SPPU Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer, Journal Suggester , etc. Publication Misconduct, Subject Specific Ethical Issues FFP, authorship Complaints and appeals: examples and fraud from India and abroad. Software tools: Use of plagiarism software like Turnitin, Urkund, and other open-source software tools.

Unit–IV(Practice):Data base and research metrics, Indexing database, Citation data base: Web of Science, Scopus, etc. Research metrics: Impact factor of Journal as per journal citation report, SNIP, SJR, IPP, Cite Score Metrics: h-index, g-index, i-10 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: Don't get scooped; don't 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 <http://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
6. Bcall,J.(2012).Predatory publishers are corrupting open access.Nature,489(7415),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-
http://www.insaindia.res.in/pdf/Ethics_Book.pdf

Research Methodology

Course Code: ELE 601

Credits: 05 (5+0)

Course Outcomes:

At the end of course, the student will be able to understand:

1. Basic concepts of research and its methodologies
2. Identify appropriate research topics
3. To be able to describe and apply theories and methods in ethics and research ethics.
4. Provide students with knowledge, general competence, and analytical skills in Research Methodology and Research & Publication Ethics.
5. Computer fundamentals including hardware , peripheral devices and various softwares.

Syllabus

Origin of Research, Objectives of Research, Motivation and Necessity of Research, Types of Research, Research Approaches, Significance and Relevance of Research, Criteria of Good Research, Major Research Mile Stones in Ancient Period, Historical Glimpses, Some Contribution of ancient Indian scholars.

What is Research Problem?, Selection of Problem, Identification of Problem, Fixing Domain and Boundaries, Methods and Techniques, Variables, Parameters and Constants, Classification, Computer Orientation of Research Problems, Research paper Preparation, Writing a Synopsis.

Research Skills: Reviewing Literature and Research Papers; Writing Research Papers, Thesis, Reports and Project Proposals; Formatting, Appendices, Citation Formats and Style; General Conventions, Issues, Plagiarism and Copyrights.

Intellectual Property Rights (IPR): an introduction; IP as a global indicator of innovations, Role of IPR in economic and cultural developments, Types of IPR, Patents, Copyrights, Trademarks, Geographical Indications, Trade Secrets, Semiconductor Integrated Circuits and Layout Designs, Protection of Plant Varieties and Farmers' Rights (PPV& RF), Industrial Designs.

Computer Application: Applications of Computers, Computer System and its Components, Operating System Definition and Functions, Working with Windows, File Management in Windows, System Utilities in Windows. Use of Word processor, Presentation software, Spreadsheet, Internet etc.

References:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International, 418p.
3. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
4. 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
5. Introduction to Information Technology, ITL Education Solutions, Pearson Education.
6. Introduction to Electronics, ITL Education Solutions, Pearson Education.

Innovative Research Approaches in Electronics

Course Code: ELE 602

Credits:05 (5+0)

Course Outcomes:

At the end of course, the student will be able to understand:

1. Design and implement a filter which is optimum for the given specifications.
2. Design a Multirate system for the needed sampling rate and can implement the same using Polyphase filter structures of the needed order.
3. Estimate the power spectrum of signal corrupted by noise through a choice of estimation methods: Parametric or Non Parametric.
4. Understand the basic concepts of VHDL.
5. Model digital systems in VHDL at different levels of abstraction.
6. To understand the different established and emerging solar cell technologies.
7. To understand the fundamental properties of materials used for solar cell devices
8. To gain a comprehensive details of parameters and applications of various sensors and transducers.
9. To understand the fundamental principle of Acoustic and ultrasonic sensors and transducers

Syllabus

Representations of discrete signals and systems and basic operators, z-Transforms, Causality and Stability in terms of z-transform, Bilateral z-transform, Computation of z-transform. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT): Discrete Fourier Series, Discrete Fourier Transform and its Properties, Efficient Computation of DFT using FFT algorithms, Linear Filtering Approach to Computation of DFT. Digital Filter Structure: Describing Equation, Structures for FIR Systems and Structure for IIR Systems, Representation of Structures using Signal Flow Graph. Design of Digital Filters: Introduction, Difference between analog filters and digital filters, Implementation of digital filter, Types of filters, LTI systems as filters, Design of IIR filters from analog filters, IIR filter design using Butterworth Approximation, Frequency transformation, FIR filters design, Least square filter design, Designing digital filter from pole-zero placement, Butterworth filter design using Bilinear transformation, FIR filter design using windows, Design of filters using pole-zero combination. Hardware Architecture of DSP Processor.

Basic concepts of hardware description languages. Design flow for VHDL based RTL/logic synthesis. Hierarchy, Concurrency, Logic, and Delay modeling, Structural, Data-flow and Behavioral styles of hardware description. Architecture of event driven simulators.

Syntax and Semantics of VHDL: Variable, signal types, arrays, attributes and tables. Data types, Operators, expressions and signal assignments. Entities, architecture specification and configurations. Component instantiation. Use of Procedures, Tasks and functions, Memory Modelling, Examples of design using VHDL. Concurrent and sequential constructs. Examples of design using Verilog. Sequential Circuit design, Finite State Machine Modeling. Synthesis of Combinational and sequential circuits.

Solar cell materials and their properties: Solar cell research: technology (silicon, organic, Dye sensitized, perovskites), applications and limitations. Characterization and analysis: ideal cell under illumination- solar cell parameters, optical losses; electrical losses, surface recombination velocity, quantum efficiency - measurements of solar cell parameters; I-V curve characteristics, internal

quantum yield measurements – effects of series and parallel resistance and temperature - loss analysis. Solar photovoltaic (PV) modules from solar cells, series and parallel connections, design and structure of PV modules.

Introduction to sensors and transducers: basic parameters, principles and applications of various sensors and transducers, characterization of materials, devices, circuits and systems; Acoustic and ultrasonic sensors and transducers; Magnetic and Electrical sensors and transducers; Thermal sensors and transducers; Radiation including optical sensors and transducers; Smart Sensors for characterization of RF materials, devices, circuits and systems; Typical applications and use of transducers in systems instruments.

References:

1. Proakis, J.G. and Manolakis, D.G., Digital Signal Processing, Prentice-Hall of India Private Limited (1996).
2. Rabiner, C.R. and Gold, B., Theory and Applications of Digital Signal Processing, Prentice-Hall of India Private Limited (2000).
3. Oppenheim, A.V. and Schaffer, R.W., Digital Signal Processing, Prentice-Hall of India Private Limited (1998).
4. VHDL: A Guide to Digital Design and Synthesis, S. Palnitkar, "Prentice Hall NJ, USA, 1996
5. Advanced Digital Design with the HDL, Michael D. Ciletti, Prentice Hall India, 2005 .
6. VHDL Primer, J. Bhaskar, Pearson Education Asia, 2001.
7. Thin Film Solar Cells by K. L. Chopra, S. R. Das, Springer 2013
8. Nanostructured Solar Cells by Narottam Das, 2017.
9. Sensors and Transducers by Ian Sinclair, Elsevier, 2011
10. Micro- and Nano-Scale Sensors and Transducers by Ezzat G. Bakhoun, CRC Press, 2015.