

गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 अ. 25 से अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
कोनी, बिलासपुर - 495009 (छ.ग.)



Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur - 495009 (C.G.)

List of Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework

Department : Pure and Applied Physics

Programme Name : *Pre-Ph.D. (Physics)*

Academic Year : 2021-2022

Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework:

Sr. No.	Course Code	Name of the Course
01.		Research Methodology & Computer applications



Scheme and Syllabus

Course Code	level	Course name	Credit	Remarks
	School level	Research Methodology & Computer Applications	04	Common to all
	Department level	Experimental, Theoretical techniques & Instrumentation in Physics Research	04	Common to Physics Candidates
	Paper –III (Optional) Anyone of the followings	III A: Advanced Materials III B: Spectroscopic Techniques III C: Advances in Plasma Physics III D: Advance Nuclear Physics III E: Advanced Astronomy and Astrophysics	04	Any course



Syllabus Pre-PhD Course Work (Physics)

Paper I

Research Methodology & Computer applications

Mode of study includes: Assigning the topic to students based on their basic background and presentation in the form of seminar which will be followed by discussion and submission of the write-up. This will be evaluated by group of teachers.

Unit 1: Research methodology

Definition of Research, Components of Research Problem, Various Steps in Scientific Research : Hypotheses, Research Purposes, Research Design, Literature searching Literature Survey, defining the question and formulating hypothesis/ hypothesizes, Collection of research data, tabulating and cataloging. Sampling and methods of data analysis.

Unit 2: Errors in measurements and statistical methods:

Types of errors; mean deviation, standard deviation and probable errors; propagation of errors with summation, difference, product and quotient Probability Theories - Conditional Probability, Poisson Distribution, Binomial Distribution and Properties of Normal Distributions, Estimates of Means and Proportions; ChiSquare Test, Association of Attributes - t-Test - Standard deviation - Co-efficient of variations. Correlation and Regression Analysis, plotting of graphs.

Unit3: Laboratory practices and safety guidelines:

Safe working procedure and protective environment, Laboratory safety measures, Handling radiation, Chemical hazards and their types, Safe chemical use , Proper storage and disposal of hazardous materials, Bio-hazardous and other toxic experimental materials, Maintenance of equipments.

Unit 4: Computer applications in scientific writing skills

Applications of Microsoft Excel, power point and origin for data processing and data analysis, research paper – presentation using power point (which include texts, graphs, pictures, tables, references etc.) (oral in power point/poster); Curve fitting, Method of least square fit, least square fit (straight line) to linear equations and equation reducible to linear equations. Non-linear curve fitting, back ground correction and mathematical manipulation in data using origin. Structure and Components of Research Report, Types of Report: research papers, thesis, Research Project Reports, Pictures and Graphs, citation styles, writing manuscript in Latex, Steps to better writing,

Unit 5: Ethics in Science:

The source of ethical issues in science: examples from different disciplines. Ethical issues in science research and reporting: objectivity and integrity, the problem of plagiarism and related issues, international norms and standards. Scientific temper and virtues, expectations from scientific community. IPR and Patent regime: Recording and storage/retention of recorded materials. Management and userresponsibilities in proper utilization of the facilities. Socio-lega issues, originality



References:

1. "How to write and Publish" by Robert A. Day and Barbara Gastel, (Cambridge University Press).
 2. "Survival skills for Scientists" by Federico Rosei and Tudor Johnson, (Imperial College Press).
 3. "How to Research" by Loraine Blaxter, Christina Hughes and Malcolm Tight, (Viva Books).
 4. "Probability and Statistics for Engineers and Scientists" by Sheldon Ross, (Elsevier Academic Press).
 5. "The Craft of Scientific Writing" by Michael Alley, (Springer).
 6. "A Students's Guide to Methodology" by Peter Clough and Cathy Nutbrown, (Sage Publications).
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