



List of Revised Courses

Department : *Pure and Applied Physics*

Program Name : *Pre Ph.D.. (Electronics)*

Academic Year : 2016-17

List of Revised Courses

| Sr. No. | Course Code | Name of the Course |
|---------|-------------|---|
| 01. | | Research Methodology & Computer Applications |
| 02. | | Basic Electronic instrumentation & Electronic material characterization |
| 03. | | Electronic materials and devices |



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2016-17

School : School of Physical Sciences

Department : Pure and Applied Physics

Date and Time : : December 12, 2016 - 11:30 AM

Venue : Smart Class Room

The scheduled meetings of member of Board of Studies (BoS) of Department of Pure and Applied Physics, School of Studies of Physical Sciences, Guru Ghasidas Vishwavidyalaya, Bilaspur, were held to design and discuss the Pre Ph.D. (Electronics), scheme and syllabi.

The following members were present in the meeting:

1. Dr. R. P. Prajapati
2. Dr. M. N. Tripathi
3. Dr. R. K. Pandey
4. Dr. Parijat Thakur
5. Dr. H. S. Tewari
6. Prof. D. P. Ojha
7. Prof. P. K. Bajpai

The committee discussed and approved the scheme and syllabi. The following courses were introduced in the Pre Ph.D. (Electronics):

- ❖ Research Methodology & Computer Applications
- ❖ Basic Electronic instrumentation & Electronic material characterization
- ❖ Electronic materials and devices

Signature & Seal of HoD









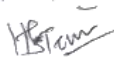
Scheme and Syllabus

Course Structure Pre Ph.D. Physics Syllabus 2016-17

| Course Code | level | Course name | Credit | Remarks |
|-------------|-----------------------------|---|--------|------------------------------|
| | School level | Research Methodology & Computer Applications | 04 | Common to all |
| | Department level | Basic Electronic instrumentation & Electronic material characterization | 04 | Common to Physics Candidates |
| | Paper -III Special Paper | Electronic materials and devices | 04 | Any course |

w.e.f. 2016-17


 विभागाध्यक्ष/H.O.D.
 पद एवं अनुस्यूक्त मौलिकी विभाग
 Dept. of Pure & Applied Physics
 गुरु घासीदास विश्वविद्यालय
 Guru Ghasidas Vishwavidyalaya
 बिलासपुर (छ.ग.)
 Bilaspur (C.G.)

 Divedi
 H. S. Tandon
 S. K. Singh
 P. K. Singh
 J. K. Singh
 M. S. Singh
 (External Expert)
 H. S. Tandon



Paper I

Research Methodology & Computer applications

Objective- • To acquaint the research scholars with the nature, scope and limitations of various methods of conducting educational research. • To develop an understanding of process of conducting educational research. • To develop an ability of appropriate selection, development and use of various tools of research

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; Chi-Square 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, ResearchProject 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 user responsibilities in proper utilization of the facilities. Socio-legal issues, originality

Outcomes - Research methods courses offer students the opportunity to learn the various aspects of the research process, framing useful research questions, research design, data collection, analysis, writing and presentation.

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 Student's Guide to Methodology" by Peter Clough and Cathy Nutbrown, (Sage Publications).

[Handwritten signatures and notes]

विभागाध्यक्ष/H.O.D.
शुद्ध एवं अनुप्रयुक्त भौतिकी विभाग
Dept. of Pure & Applied Physics
गुरु घासीदास विश्वविद्यालय
Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.)
Bilaspur (C.G.)



Paper III

Electronic materials and devices

Objective - The course is designed to teach the physics behind electronic device operations and also prepare students for advanced courses in solid state and quantum electronics. The main emphasis is on the fundamental physics behind device operation.

Unit I (HST)

Linear and non linear dielectric materials, Ferroelectric, piezoelectric and electro-optic materials, composite materials, Liquid crystals, quasi-crystalline materials, hydride materials,

Unit II (PD)

Functional materials for device fabrication, sensor materials, shape memory alloys, hydrogen storage materials, solar cell fabrication and photovoltaic materials.

Unit III (TGR)

Carbon allotropes, fullerene, carbon nano tubes, graphene, graphite oxide and applications, Applications of carbon materials, Functionalization of graphene and carbon nanotubes

Unit IV (TGR)

Lithographic processes: Various types of lithographic processes, Photolithography, Electron beam lithography, Ion beam lithography, and advances in the field. Photoresists, Sensors fabrication, and FET fabrication.

Unit V

Nano machines and nano devices: Micro electromechanical systems, Nano electromechanical systems NEMS's, Carbon nanostructures, Carbon nanotube, Graphene and applications.

Outcomes -Students completing the course will be able to: (1) Calculate the electrical conductivity from the charge density and mobility (2) Calculate the charge density from the Hall coefficient

Reference Books

1. Dielectric relaxation in solids, A.K.Jonscher
2. Dielectrics and Waves, R. Von Hippel
3. Physics of Low dimensional semiconductors, J.H.Davies Carbon Nanotubes, Dresselhaus M.S., Dresselhaus G. and Avouris P.

Handwritten signatures and notes:
Divedi
HST exam
Srijat
Panda
Joni
Srivastava
Mishra
(External expert)
HST exam
2009
विभागाध्यक्ष/H.O.D.
उच्च एवं अनुप्रयुक्त भौतिकी विभाग
Dept. of Pure & Applied Physics
गुरु घासीदास विश्वविद्यालय
Guru Ghasidas Vishwavidyalaya
बिलासपुर (छ.ग.)
Bilaspur (C.G.)