



UTTARANCHAL
UNIVERSITY

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Arcadia Grant, P.O. Chandanwari, Premnagar, Dehradun,
Uttarakhand-248007, INDIA

Detailed Course Structure & Syllabus of

**Pre Ph.D. (Physics)
Course Work**

Session: 2017-18



Course Structure & Syllabus of Pre Ph.D. (Physics)
Session: 2017-18

EVALUATION SCHEME
Pre Ph.D. (Physics)
Course Work

Course Structure & Syllabus of Pre Ph.D. (Physics)
Session: 2017-18

Scheme of Pre-Ph.D. Course Work

S. No	Course Code	Subject	Credits	Evaluation - Scheme							
				Period			Sessional			Examination	
				L	T	P	CT-I	CT-II	Total	ESE	Sub. Total
1.	RM-101	Research Methodology & Computer Application	7	6	1	0	20	20	40	60	100
2.	PHY-102	Advances in Physics	7	6	1	0	20	20	40	60	100
3.	RLS-103	Review of Literature & Seminar Presentation	6	0	0	10	20	20	40	60	100
Total			20	12	2	10	60	60	120	180	300



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RM 101: RESEARCH METHODOLOGY

Course Objectives:

1. To Equip the Students with the Concept and Methodology of Research.
2. To provide knowledge about type of research, preparation of reports and thesis, designing of Research using Scientific Methods like statistical methods and computer skills.

UNIT-I

Introduction to Research: Definition, Nature and significance, Role and Objectives; Types of Research: exploratory, descriptive, experimental and diagnostic research, social and legal research and traditional, analytical, empirical & fundamental research, Doctrinal and non-doctrinal research methods; Various Research Designs; Scientific Research Process: Overview, Problem identification and formulation of research statement.

UNIT-II

Data Collection: sources, primary and secondary methods, significance of Primary and Secondary Data, questionnaire Vs. schedules; Data Processing: Editing, Coding Organization and Presentation; Attitude Measurement and scaling: Measurement Scales, Sources of Errors in Measurement, Techniques of Developing Measurement Tools, Classification and Testing (Reliability, Verification and Validity) Scales, Designing Questionnaires and Interviews.

UNIT-III

Sampling, Sampling Methods, Sampling Plans, Sampling Error, Sampling Distributions: Theory and Design of Sample Survey, Census Vs Sample Enumerations, Objectives and Principles of Sampling, Types of Sampling, Sampling and Non-Sampling Errors.

UNIT-IV

Statistical Tools / Methods for research – Univariate and Bivariate Analysis. Hypothesis and Testing:



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Parametric & Non-Parametric Tests, F-Test, t-Test, z-Test, Correlation and Regression, U- Test, Kruskal-Wallis Test, Chi Square Test. Use of Various Statistical Tools on SPSS.

UNIT-V

Interpretations and Report Writing: Meaning of Interpretation, Techniques of Interpretation, Precautions in Interpretation, Significance of Report Writing, Steps in Report Writing, Layout of Report and Precautions in Writing Research Reports. Limitations of RM: Ethics in Research, Philosophical Issues in Research. Use of Internet for Research Work and Exploring Various Websites and Search Engines for Collecting Quality Literature Review and Secondary Data.

Text Readings

1. William G. Zikmund, "Business Research Methods", Orlando: Dryden Press.
2. C. William Emory and Cooper R. Donald, "Business Research Methods", Boston, Irwin.
3. Fred N Kerlinger, "Foundations of Behavioural Research", New Delhi: Surjeet Publications.
4. Naresh Malhotra, Marketing Research : An Applied Orientation, Pearson publication David. Nachmias and Chava Nachmias, "Research Methods in the Social Sciences", New York: St.Marlia's Press.
5. C. R. Kothari, "Research Methodology: Methods and techniques", New Delhi: Vishwa Prakashan.



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PHY 102: ADVANCES IN PHYSICS

Course Objectives:

1. The objective of this course is to learn about nanotechnology and its applications.
2. The course also covers the Preparation and characterization techniques required for nanotechnology.

UNIT-I

Introduction to Nanoscience & Technology; Carbon Nanotube (Quantum Dot), Properties of Nanomaterials, Semiconductor Nanoparticles, Metal-based Nanostructures, Polymer-based Nanostructures, Nanocomposites of inorganic and organic systems, Renewable Energy, Solar Cells, Solar Photo Thermal and Photovoltaic Devices. Fundamental concepts and applications of Ferroelectric, Polymer and Ferrimagnetic Materials. Compound nucleus hypothesis, Theoretical studies of Nuclear and Astroparticle.

UNIT - II

Experimental Studies and Preparation: Synthesis of materials by Solid State Reaction method, Sol-gel method, Citrate precursor technique, Thin-film technique: Production and Measurement of Rough to Ultra High Vacuum, Combustion and Co-precipitation method, Mechanical Ball milling, Plasma synthesis, Low-Temperature water-chiller synthesis etc.

UNIT - III

Characterization and Measurements: Introduction and Working Principle of X-ray Diffractometer, Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Vibrating Sample Magnetometer (VSM), Vector Network Analyzer (VNA), Impedance Analyzer (Four-Probe Technique), Thermogravimetric Analyzer (TGA), Fourier Transform Infrared Spectroscopy (FTIR), IR and UV-Visible Spectroscopy, etc.

UNIT - IV

Scientific Presentation: Presentation of research work in power point (which includes text subjected to research work with graphs, picture, tables, reference etc.), Literature



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survey of the previous works and search for articles, Review of an article in the relevant field and preparation of a short report, Steps of research; Paper, article, Synopsis and Thesis writing.

Reference Books:

1. Nanoparticles and Nanostructured Films-Preparation, Characterization and Applications: J.H. Fender (Wiley).
2. A Text Book of "Engineering Physics" by N.Gupta.
3. Solid State Physics by S.O.Pillai, New Age International, 5rd Ed.
4. Introduction to "Nuclear and Particle Physics", 3rd Edition, by Mittal, Verma, and Gupta.
5. The Renewable Energy Handbook by William H. Kemp.
6. Thermal Energy Storage: Systems and Applications by Ibrahim Dincer, Marc A. Rosen.
7. Thin Films Phenomena by K.L. Chopra.
8. Sol-gel Science: The Physics and Chemistry of Sol-gel Processing by C.Jeffrey Brinker and George W. Scherer.
9. Experimental X-Ray Diffraction, B.D. Cullity, Prentice Hall India, 3rd Ed., 2001.
10. Microstructural Characterization of Materials, D.BramdonWiley, 1999.
11. Experimental Techniques in Condensed Matter Physics at Low Temperatures, Robert C. Richardson and Eric N. smith, Addison Wesley Longman, Inc., 1998.
12. Measurement, Instrumentation Experiment design in Physics and Engineering, M. Sayer and Abhai Mansingh, Prentice Hall India, 2000.



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RLS-103: REVIEW OF LITERATURE AND SEMINAR PRESENTATION

Course Objectives: Main objective of this course is to develop presentation skills in the scholars and knowledge about review of literature so that they can review properly in the concerned field

Review of Literature and Seminar Presentation-Candidate/Research Scholar has to go through the review of literature in the concerned field of research. Review of literature guidelines will be given by the concerned faculty/Dean of Department/School/College. Research Scholar has to give prepare presentation on review of literature in the concerned field/ topic assigned by the department (DRC) periodically during course work.

There will be minimum 3 presentations of review of literature during pre-Ph.D. course work. Final presentation would be required at the time of end term/semester examination on proposed synopsis. General guidelines would be issued by Dean-Research for seminar presentation.