



UTTARANCHAL
UNIVERSITY

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

Detailed Course Structure & Syllabus of

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

Session: 2018-19



Course Structure & Syllabus of Pre Ph.D. (Chemistry)
Session: 2018-19

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

Course Structure & Syllabus of Pre Ph.D. (Chemistry)
Session: 2018-19

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.	CHY-102	Advances in Chemistry	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

UNIT-I

Introduction to Research: Definition, Nature and significance, Role and Objectives; Types of Research; Doctrinal and non-doctrinal research methods; Various Research Designs; Scientific Research Process: Overview, Problem identification and formulation of research statement. Types and nature of various research design

UNIT-II

Data Collection: sources of secondary data methods of primary data collection: personal interview, questionnaire method, observation method 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. Sampling design process. Sample size determination

UNIT-IV

Statistical Tools / Methods for research – Univariate and Bivariate Analysis. Hypothesis and Hypothesis Testing: Parametric & Non-Parametric Tests, Use of Various Statistical Tools on SPSS F-Test, t-Test, z-Test, Correlation and Regression, U- Test, Kruskal-Wallis Test, Chi Square Test, Run Test

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



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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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CHY 102: Advances in Chemistry

Course Objectives:

1. To understand Spectroscopic, Analytical and physical techniques used in characterisation of materials.
2. To assess nano material & techniques for application in applied field.

UNIT-I

Application of Spectroscopic Studies in Chemical Research, Fundamental Concepts, Principle, Instrumentation, Interpretation of Spectrum and Applications of IR and UV-Visible Spectroscopy, Mass Spectroscopy & NMR Spectroscopy. Chromatographic Techniques: Applications of Chromatographic Techniques in Chemical Research. Concept, Principle & Instrumentation of TLC, Column, HPLC, HPTLC & concept and application of Gas & mass chromatography. Thermal Analysis: TGA, DTA & DSC – Principle, Interpretation of Spectra and Application. Interpretation of Spectra and Application of SEM, TEM, Interpretation of Spectra and Application XRD.

UNIT-II

Organometallic Chemistry of Li, Mg: Preparation, Reaction & Applications, Green Chemistry; Applications of green chemistry in research Environmental Chemistry (Water-Pollutants, manmade and environmental factors, Hardness- Types of hardness, permanent and temporary and its determination. Heavy Metals and Their Effect in human being, food chain, ecosystem. Photo Chemistry- Photon Molecule Interactions; photochemical reaction, Absorption, Fluorescence and Phosphorescence; Quantum Yield; Flash Photolysis.

UNIT-III

Electrochemistry: Laws, Electrolytic and Fuel Cells; Solar Cells (Photochemical); Batteries (Solid-State & Conventional, Corrosion –Types, Mechanism and Control.

Kinetics: Zero, First, Second, Nth Order Reactions. Chemical Equilibrium – Systems and Factors Affecting Equilibrium.

UNIT-IV

Nanocomposites, Preparation and screening methods of nanocomposites; Sol gel method, hummers method, CVD. Refractory Materials, Polymers: Introduction and Classification, Copolymerization, Reinforcing and Fiber Spinning Film and Laminates. Preparation And Applications of Nylon, Polyesters (Terylene and Dacron), Rubber, Vulcanization of Rubber, Synthetic Rubber, Buna-N Rubber, Copolymers of Butadiene and Acrylonitrile. Vinyl



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Polymers, Characterization: Measurement of Molecular Weight, Solution Viscosity, Light-Scattering Property, X-Ray Diffraction Study, Thermal Analysis and Physical Testing. The Physical Properties of Polymers. Glass Transition (T_g), Melt Transition (T_m), Relationship Between T_g and T_m :

Reference Books-

1. Inorganic Chemistry by J.D.Lee.(Wiley Publication).
2. Organic Chemistry by I.L.Finnar
3. Advanced Physical Chemistry by Gurtu&Khera
4. Advanced Physical Chemistry by Atkins
5. Instrumental Chemistry by Chatwal and Anand.



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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.