Syllabus for Course work

Ph.D in Chemistry

Paper I Research Methodology

Unit – I

Philosophy of Science and Literature survey

Literature survey – Sources of Information – Primary, Secondary, Tertiary sources – Chemical Journals – Journal abbreviations. Chemical abstracts – Subject Index, Author Index, Formula Index and other Indices with examples. Dictionary of Compounds – Beilsteins and other hand books.

Web resources – E-journal – citation index – impact factor – H- Index – E-Consortium – UGC infornet – E-Books – Search engines: scirus, Google Scholar, Chem Industry, Wiki – Databases: Chem Spider, Science Direct, Scifinder, Scopus.

Unit II

Methodology of Scientific Document Writing

Introduction to technical writing – types of report, title and abstract, the text – style and conventions in writing. Writing dissertation and thesis – Title, Abstract, Introduction, Literature Review, Experimental Methods, Results and Discussion, Foot notes, Figures, Data Presentation, Tables, Sign Conventions followed- Conclusions and Recommendations – Bibliography.

Preparation of Manuscript and posters – Writing review article and book reviews – preparing research proposals for grants – ethics in scientific publication – formats for some national and international journals.

Unit III

Data Analysis

True value – standard value – observed value – Error – Types of Errors – Accuracy – Precision, Error Analysis, Minimization of Errors, Deviation from Accurate Results – the Binomial Distribution – the Gaussian Distribution – Mean – Median – Deviation – from Mean and Median – student's test, F-test – Significant t Figures in Multiplication – Division – Addition and Subtraction – Curve Fitting method of Least Squares – Linear Regression – Multiple Linear Regression – Slope – Intercept and Correlation Coefficient

Research Ethics Good Laboratory Practices and Safety

Chemical Ethics, Research Ethics-Honesty in Science; Integrity and Authorship and Conflicts of Interest, Privacy and Confidentiality.

Introduction : History, definition, Principles, Good Laboratory Practices (GLP) and its application GLP training : Resources, Rules, Characterization, Documentation, quality assurance, Resources, Facilities: building and equipment, Personnel, GLP and FDA, Stepwise implementation of GLP and compliance monitoring.

Safe working procedure and protective environment, protective apparel emergency procedure and first aid, laboratory ventilation, safe storage and use of hazardous chemicals, procedure for working with substance that pose hazards, flammable or explosive hazards, procedures for working with gases at pressures above or below atmospheric – safe storage and disposal of waste chemicals, recovery, recycling and reuse of laboratory chemicals, procedure for laboratory disposal of explosives, identification, verification and segregation of laboratory waste, disposal of chemicals in the sanitary sewer system, incineration and transportation of hazardous chemicals.

Unit V

Analytical techniques and Nanochemistry

The principle, instrumentation and applications of TGA/DTA/DS, SEM & TEM, AAS Techniques.

Nanochemistry

Basic idea of nanochemistry – Defining nanoassemblies – Simple methods of preparation of nanomaterials – Techniques for the characterization of nanomaterials – AFM and SEM – Important applications of nanomaterials.

Fullerences – carbon nanotubes – biomaterial – functionalized nanoparticles.

References

Unit I

1. http:/www.inflibnet.ac.in
2. http:/www.springerlink.com
3. http:/www.rsc.org
4. http:/www.pubs.acs.org
5. http:/www.seciencedirect.com
6. J.March,"Advanced organic chemistry; Reactions, Mechanism and Structure " 6^{th} Ed., Wiley – Interscience, 2007.

UNIT II

1. M.Coghill and L.R.Gardson, The ACS Style Guide – Effective Communication of Scientific Information, 3rd Edn, Oxford University Press, 2006
2. H.Beall and J.Trimbur, A Short Guide to Writing about Chemistry, 2nd Edn, Longman, 2001,
3. J.Anderson, B.H.Durston and M.Poole, "Thesis and Assignment Writing", John Wiley, Sydney 1970
4. R.Berry, "How to write a Research Paper". Pergamon, Oxford, 1986.
5. Ralph Berry, "The Research Project: How to Write It", 4th Ed., Routledge, Taylor and Francis, London 2000,
6. W.G.Campbell – "Form and Style in thesis writing, Houghton Mifflin Co., Boston M.A., 1970.

UNIT III

1. S.P.Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 1993
2. D.Brynn Hibbert and J.Justin Gooding, Data Analysis, Oxford University Press, New York, 2006
3. C.R.Kothari, Research Methodology, Methods and Techniques, Wiley Eastern Ltd., New Delhi, 1991.

UNIT IV

1. Handbook Good Laboratory Practice (GLP) Quality Practices for Regulated Non – Clinical Research and Development.
2. Willa Y.Garner, Maureen S.Barge, and James, P, Good Laboratory Practice Standards: Applications for Field and Laboratory Studies (ACS Professional References Book)
3. Chemical safety metters – IUPAC –IPCS, Cambridge Univ.Press, 1992.

UNIT V

1. G.D.Christian & J.E.O'Reily, Instrumental Analysis, 2nd Ed., Allyn & Balon, 1986.
2. H.H.Willard, L.L.Merritt, J.A.Dean and F.A Settle, Instrumental Methods of analysis, 7th ed., CBS Publishers, New Delhi, 1986.
3. D.A.Skoog, F.J.Hooler and T.M.Niemann, Principles of Instrumental Analysis, 5th Ed., Harcourt Asia Pvt.Lts., 2001
4. Srivastava, Chemical Analysis: An Instrumental Approach, S.Chand, New Delhi
5. F.A.Settle, Ed.Handbook of Instrumental Technique for Analytical Chemistry, Pearson Edn., Indian 1997.
6. C.N.R.Rao, A.Muller, a.Cheethan, Eds.The Chemistry of Nanomaterials, Wiley, New York, 2004.