Ph.D. Course work
Chemistry Syllabus

(Effective from Academic Session: 2025-26)

P. G. Department of Chemistry
MSCB University
Sriram Chandra Vihar
Baripada, Odisha-757003

Course Structure of Ph.D. Coursework in Chemistry

(Effective from Academic Year 2025-26)

Sl. No	Course Title	Course Code	Credit	Full Mark
1.	Research Methodology	CH-801	04	100
2.	Research and Publication Ethics	CH-802	02	50
3.	Literature Review and Presentation	CH-803	06	150
Total			**12**	**300**

PROGRAMMEOUTCOME:

- Gained knowledge about research, literature survey, scientific paper writing and communication
- Gained knowledge on instrumental techniques for the synthesis, analysis and characterization of synthesized compounds and prepared materials.

PROGRAMME SPECIFIC OUTCOME:

- Expected to gain basic knowledge on literature survey, scientific ethics and scientific writing
- Constructive analytical skill will be developed for studies on advanced research and industrial jobs
- Create a responsibility and awareness to maintain safer laboratory practice and systematic documentation

CH 801 **Marks-50 (5 Credits)**

RESEARCH METHODOLOGY

OBJECTIVES

This course aims to equip the students with various methods adopted for research, statistical methods for data analysis and application of computers in chemistry research.

CONTENTS

UNIT-I

Scientific Research: Definition, characteristics, types, need of research, Identification of the problem, assessing the status of the problem, formulating the objectives, preparing design (experimental or otherwise), Actual investigation, determining the mode of attack.

UNIT-II

Literature Survey: Primary sources (Journals and Patents), Secondary resources (abstracts, CA, collective indexes, reviews, awareness service, general treatise, monographs on specific areas, reference books), Basic ideas of literature search on web (Scifinder, Scopus, Scirus, Science Direct), Citation index, Impact factor of research papers.

UNIT-III

Documentation and Scientific writing: Organization and writing of manuscript/paper, monographs, authored books and edited books, Thesis writing, Structure and Components of Research Report, Types of Report: research papers, thesis, Research Project Reports, Pictures and Graphs, citation styles, writing a review of paper, Bibliography, research ethics and Plagiarism check.

UNIT-IV

Statistical Methods of Data Analyses: Fundamental of statistical analyses- types, mean, median, mode, range, variance, standard deviation, Test for rejection of outliers (Q test), Levels of confidence and significance, Test of significance (F-test, student T-test, paired T-test), Least square methods of fitting linear equations, (simple linear cases and weighted linear case), correlation coefficient and coefficient of determination.

UNIT-V

Computer Applications in Chemistry: Computer software and chemistry, Computer technique used in chemistry with special reference to UV-Visible spectroscopy,

chromatography, mass spectroscopy, Applications of some computer packages (MS-Excel, Origin, Chem draw) to chemistry.

COURSEOUTCOME:

After completion of this course student can able to

- Write research article/research paper/project report/own thesis or dissertation.
- Select the suitable journal to publish the research work.
- Know various statistical methods for data analysis.
- Apply computer technique for spectral analysis.
- Know various computer packages like MS-Excel, Origin, Chemdraw etc.

Books Recommended

1. Research Methodology-Methods & Techniques, C.R.Kothari,Wiley Eastern Ltd. New Delhi 1985.
2. Research Methodology - A step by step Guide for Beginners 2nd edn. Kumar Ranjit, Pearson Education, Singapore, 2005.
3. Introduction to Research & Research Methodology. M.S. Sridhar.
4. Analytical Chemistry, G.D. Christian,6th Edn,Wiley Student Edition.
5. Computer for Chemists, S.K.Pundir & A.Bansal, Pragati Prakashan 2008.
6. Nomenclature for the presentation of results of chemical analysis.(IUPAC Recommendations 1994) *Pure and Appl. Chem.*Vol.66, No. 3, pp.595-608,1994.
7. B. S. Furniss, A. J. Hannaford, P.W.G. Smith, A. R. Tatchell,Vogel'sText Book of Practical Organic Chemistry, 5th Edition, Pearson, New Delhi, 1989.

Research and Publication Ethics

CH-802 **Marks- 50 (2 Credit)**

Course Objective

- To sensitize students on publication ethics
- To focus on research integrity, research misconduct and predatory publications, indexing, citation database, open access publication, research metrices and plagiarism

UNIT-I: Publication Ethics

Defination, introduction and importance, conflict of interest, publication misconduct, violation of publication ethics, authorship and contributorship, predatory publishers and journals

UNIT-II: Scientific Conduct

Ethics with respect to science and research, intellectual honest and research integrity, scientific misconduct (falsification, fabrication and plagiarism),

UNIT-III: Open Access Publishing

Open access publications and initiatives, software tool to identify predatory publications developed by SPPU, journal finder/journal suggestion tools viz, JANE, Elsevier journal finder

UNIT-IV: Publication Misconduct

Ethical issues, authorship, conflict of interest, Complaints and appeals: examples and fraud from India and abroad, Use of plagiarism detection software like Turnitin and Urkund

UNIT-V: Databases and Research Metrics

Databases: Indexing databases, citation databases such as Web of Science, Scopous etc.

Research Metrics: Impact Factor of Journal as per Journal Citation Report, SNIP, SJR, IPP, Cite score, h-index, i-10 index, g index, altmetrics

Course Outcomes

It helps the research scholar to know the tools for publication of research findings, exposure to different softwares, databases, and metrices.

Books Recommended

1. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN: 978-81-939482-1-7
2. Bcall, J, (2012), Predatory publishers are corrupting open access. Nature, 489 (7415),

179.

3. P. Chaddah (2018), Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865

CH-803 **Marks-150 (06 Credits)**

Literature Review and Presentation

Literature Review work along with seminar presentation