

# Devi Ahilya Vishwavidyalaya, Indore

## Ph.D. Course work in Chemistry (2021)

The Ph.D. Course work in Chemistry shall have one semester course. It is necessary to secure minimum 50% passing marks in all the papers separately. The Course is governed as per the University Ordinance No. 11.

**The Ph.D. course work shall contain the following courses:**

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|--|------------------|
| <b>1. Research Methodology</b>                               | <b>4 credits</b> |
| <b>2. Review of Published Research in the relevant field</b> | <b>3 credits</b> |
| <b>3. Computer Applications</b>                              | <b>3 credits</b> |
| <b>4. Advance course in the relevant subject</b>             | <b>3 credits</b> |
| <b>5. Research and Publication Ethics</b>                    | <b>2 credits</b> |
| <b>6. Comprehensive Viva-Voce</b>                            | <b>3 credits</b> |

### CHEM-101: RESEARCH METHODOLOGY

**Credits 4**

<b>Unit-I</b>	Purification of various solvents for organic and inorganic applications, Various laboratories techniques
<b>Unit-II</b>	UV-Visible Spectrophotometry: Introduction, electronic transitions, effect of solvent and extending conjugation and steric hindrance on electronic transitions, Fieser Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic compounds.  High Performance Liquid Chromatography(HPLC): Principle of High Performance Liquid Chromatography, the Chromatograph, the requirements of solvent pumping and different pumping systems, gradient elution, isocratic elution, sampling, detectors for liquid chromatography, the mobile phase in HPLC, column selection, quantitative/qualitative analysis
<b>Unit -III</b>	QSAR studies. Drug designing approaches, and their relevance to the determination of medicinal properties
<b>Unit -IV</b>	Catalysis: Catalytic reactions and techniques, Surface analysis techniques. Gas Chromatography(GC): Theory of gas chromatography, column efficiency and column equation, sample injection, sampling system for capillary columns and packed columns, detectors, gas flow control system, high resolution gas chromatography
<b>Unit-V</b>	Green Chemistry-Introduction, Principles of Green Chemistry, Various Green Chemistry approaches in chemical synthesis, Examples

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**CHEM-102 COMPUTER APPLICATIONS  
( Theory and Practical )**

**Credits 3**

<b>Unit- I</b>	<b>Use of standard Programs and Packages</b>  Running of standard Programs and Packages such as MS WORD, MS EXCEL, Power Point preparation and Presentation of research work
<b>Unit-II</b>	<b>Programming in Chemistry</b>  Developing of small computer programs involving simple formulae in Chemistry such as Van der Waals equation. Chemical Kinetics (Determination of Rate constant), Radioactive decay (Half Life and Average Life), Determination Normality, Molarity and Molality of solutions, Evaluation of Electronegativity of atom and Lattice Energy.
<b>Unit- III</b>	<b>Use of Computer Softwares</b>  General awareness of Software packages and other scientific application packages. Applications and uses of common softwares in chemistry, Origin, Chemskech ,Programs related to pi-Chart, Bar diagram

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**Credits 3**

**CHEM-103 ADVANCED COURSE: INTERPRETATION OF SPECTRA  
(Theory and Practice)**

**Unit –I:**

**ESR spectroscopy**

- Introduction, Basic Principle, Instrumental Features and Interpretation Exercises
- Structure elucidation using combined spectral techniques data

**Unit –II:**

**Infra-Red spectroscopy**

Introduction, Basic Principle, Instrumental Features and Interpretation Exercises

**Unit –III:**

**NMR spectroscopy**

Introduction, Basic Principle, Instrumental Features and Interpretation Exercises

**Unit –IV:**

**Mass spectrometry**

Introduction, Basic Principle, Instrumental Features and Interpretation Exercises

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**Credits 3**

### **CHEM-104: Review of Published Research in the relevant field**

Ph.D. Research scholars will survey the literature related to their field of research. Each student shall submit two copies of a review article based on published work in the fields of their respective research domain. The review must contain at least 100 relevant up-to-date references for evaluation.

Candidates will submit the review of literature surveyed before the dates of their scheduled presentation.

**Credits 2**

### **Research and Publication Ethics**

## Syllabus in detail

### THEORY

- **RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
  1. Introduction to philosophy: definition, nature and scope, concept, branches
  2. Ethics: definition, moral philosophy, nature of moral judgements and reactions
  
- **RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
  1. Ethics with respect to science and research
  2. Intellectual honesty and research integrity
  3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
  4. Redundant publications: duplicate and overlapping publications, salami slicing
  5. Selective reporting and misrepresentation of data
  
- **RPE 03: PUBLICATION ETHICS (7 hrs.)**
  1. Publication ethics: definition, introduction and importance
  2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
  3. Conflicts of interest
  4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
  5. Violation of publication ethics, authorship and contributorship
  6. Identification of publication misconduct, complaints and appeals
  7. Predatory publishers and journals

### PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**
  1. Open access publications and initiatives
  2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
  3. Software tool to identify predatory publications developed by SPPU
  4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.
  
- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**
  - A. Group Discussions (2 hrs.)**
    1. Subject specific ethical issues, FFP, authorship
    2. Conflicts of interest
    3. Complaints and appeals: examples and fraud from India and abroad
  
  - B. Software tools (2 hrs.)**

Use of plagiarism software like Turnitin, Urkund and other open source software tools
  
- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**
  - A. Databases (4 hrs.)**
    1. Indexing databases
    2. Citation databases: Web of Science, Scopus, etc.
  
  - B. Research Metrics (3 hrs.)**
    1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
    2. Metrics: h-index, g index, i10 index, altmetrics

