Syllabus

A Practical Frame work to Research and Development

Objectives

To enable the students

- To understand basic elements of scientific research
- To get familiarized with various instrumental methods
- To develop skills in data analysis and chemical analysis

Learning outcomes

- To apply the methods of research
- To understand the principles behind various instrumental methods
- To develop skill on graphical representaion of data
- To develop skill on drawing chemical structure
- To analyse food adulteration
- To apply chomatoraphic tecchniques of analysiis

Module 1: Research discover and design (10 Hours)

Overview of Research Process, familiarizing students with a variety of research methods, including survey research, interviewing, participant observation, case studies, comparative analysis, and the use of documentary/primary sources, Conducting a literature review**,** Constructing Hypotheses, Identifying Variables, Types of Study Designs, Selecting a Method of Data Collection, To organize and describe data and effective display, Ethical Issues in Research, Validity and Reliability in Research, Scientific paper writing. Introduction to Journals and Publishers, Publishing a scientific paper, Peer review process.

Module 2: Instrumental Techniques (10 Hours)

Chromatographic techniques, Column Chromatography, Paper chromatography, Thin layer chromatography Fourier-transform infrared spectroscopy, UV-Visible Spectroscopy, Photoluminescence Spectroscopy, Optical methods- Polarimeter, Turbidimeter

Module 3: Data Analysis (10 Hours)

General introduction to Origin Pro for converting data to graphs, Chemdraw for 2D and 3D representation of molecular structure. Research work presentation

Module 4: Practical approach to Chemical analyses (10 Hours)

Food adultration, Structural characterization, Separation identification and purification of components by Chromatographic methods

References

1) C.R. Kothari, *Research Methodology: Methods and Techniques*, 2nd Revised Edition, New Age International Publishers, New Delhi, 2004.
2) J. Mendham, R. C. Denney, J. D. Barnes, M. Thomas, *Vogel's Text Book of Quantitative Chemical Analysis*, 6th Edn., Pearson Education, 2003.
3) R. P. Budhiraja, *Separation chemistry*, New Age International (P) Ltd., 2007.
4) Shyam Narayan Jha, *Rapid Detection of Food Adulterants and Contaminants: Theory and Practice*, Academic Press, 2015.
5) *Encyclopedia of Food Chemistry*,Elsevier, 2018.