

FBEF-705: RESEARCH METHODOLOGY

Literature Survey: (10 Lectures)

Print: Sources of information: Primary, secondary, tertiary sources; Journals: Journal abbreviations, abstracts, current titles, reviews, monographs, dictionaries, text-books, current contents Subject Index, Substance Index, Author Index, Formula Index, and other Indices with examples.

Digital: Web resources, E-journals, Journal access, TOC alerts, Hot articles, Citationindex, Impact factor, H-index, E-consortium, UGC infonet, E-books, Internet discussion groups and communities, Blogs, Preprint servers, Search engines, Scirus, Google Scholar, Wiki-Databases, Science Direct, SciFinder, Scopus. Information Technology and Library Resources: The Internet and World WideWeb. Internet resources for Physics. Finding and citing published information.

Methods of Scientific Research and Writing Scientific Papers: (10 Lectures)

Reporting practical and project work. Writing literature surveys and reviews. Organizing a poster display. Giving an oral presentation. Writing scientific papers – justification for scientific contributions, bibliography, description of methods, conclusions, the need for illustration, style, publications of scientific work. Writing ethics. Avoiding plagiarism.

Data Analysis (10 Lectures)

The Investigative Approach: Making and Recording Measurements. SI Units and their use. Scientific method and design of experiments. Analysis and Presentation of Data: Descriptive statistics. Choosing and using statistical tests. Analysis of variance (ANOVA), Correlation and regression, Curve fitting, fitting of linear equations, simple linear cases, weighted linear case, analysis of residuals, General polynomial fitting, linearizing transformations, exponential function fit, r and its abuse. Basic aspects of multiplelinear regression analysis.

Reference Books

- ② ②Dean, J. R., Jones, A. M., Holmes, D., Reed, R., Weyers, J. & Jones, A.(2011) *Practical skills in chemistry*. 2nd Ed. Prentice-Hall, Harlow.
- ② ②Hibbert, D. B. & Gooding, J. J. (2006) *Data analysis for chemistry*. OxfordUniversity Press.
- ② ②Topping, J. (1984) *Errors of observation and their treatment*. Fourth Ed., Chapman Hall, London.
- ② ②Levie, R. de, *How to use Excel in analytical chemistry and in general scientific data analysis*. Cambridge Univ. Press (2001) 487 pages.