

**ACADEMIC AFFAIRS OFFICE
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

No. Acd./ 3182/IAPC-79

Dated: February 06 , 2020

Head, Department of Chemistry
(through e-mail)

The IAPC in its 79th meeting held on 28.01.2020 vide **Item No. 79.3.2** accepted the revised syllabus of Pre-Ph.D. course CYN-901: Research Methodology in Chemical Sciences of Department of Chemistry.

The approved course is attached as **Appendix-A**.


Assistant Registrar (Curriculum)

Copy to (through e mail):-

1. All faculty
2. All Heads of Departments/ Centres
3. Dean, Academic Affairs
4. Associate Dean of Academic Affairs (Curriculum)
5. Channel I/ Academic webpage of iitr.ac.in

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPTT./CENTRE: Department of Chemistry

1. **Subject Code:** CYN-901 **Course Title:** Research Methodology in Chemical Sciences
2. **Contact Hours:** **L:** 2 **T:** 1 **P:** 0
3. **Examination Duration (Hrs.):** **Theory:** 2 **Practical:** 0
4. **Relative Weightage:** **CWS:** 20-35 **PRS:** 0 **MTE:** 20-30 **ETE:** 40-50 **PRE:** 0
5. **Credits:** 3 **6. Semester:** Both **7. Subject Area:** PEC
8. **Pre-requisite:** NIL
9. **Objective:** To introduce research ethics and methodologies for scientific research and writing in chemistry

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1	Overview of chemistry research: Objectives of research, importance of research methodology in chemistry research, general principles of research design, types and methods of research, identification of research-problem, and statement of research problem.	3
2	Chemical literature survey: Sources of information, need for reviewing literature, primary-secondary-tertiary sources, journals, journal abbreviations, abstracts, current titles, reviews, monographs, dictionaries, text books, current contents; TOC alerts, Search engines (Google scholar, SciFinder, Beilstein, Web of Science, Scopus), publication ranking analytics, author identification – ORCID and Publons ID.	4
3	Chemistry data presentation tools: Use of drawing tools such as Excel, Sigma Plot, Origin, Matlab, Chem Draw and open source software; plotting of various spectra, images and diagrams.	5
4	Methods of chemistry research: Inculcation of scientific temper, avoidance of prejudices and lax judgements, impulses of a strong will to do research, persistent hard work and concentration, developing high-minded independence of judgement and thirst for scientific originality, planning of research, formulation of selected problems, hypothesis formation, design and execution of experiments, collection and interpretation of experimental data, observation, arriving at conclusions; Maintaining logbooks, documentation of experiments and data in laboratory notebook, importance of safety and security of data.	5
5	Documentation and presentation of research output: Reporting the results of research - style and format, title, abstract and the text, abbreviations, tables,	6

	figures, legends, elucidations, quotations and footnotes, references; Guidelines of presentation of data, typesetting, templates, formulas and equations, reference formats, supplementary data; Writing style for communications, perspectives, review articles, accounts monographs, dissertations and theses; drafting, refinement, common errors, editing services, proof reading; Presentation modes – board, poster, power-point, audio-visual.	
6	Ethics in research: Authorship, citation and acknowledgement, reproducibility of results, plagiarism, similarity check, duplicate and redundant publications, predatory publishing, open access licenses, embargo period, repositories, conflicts of interest, bio-ethics, social networks for promotion, intellectual property rights.	3
7	Chemical and laboratory safety: Safety rules of laboratory, MSDS, disposal of chemical wastes, use of fire extinguisher, first aid and antidotes.	2
Total		28

11. Suggested Books

Sl. No.	Authors/ Title/ Publisher	Year of Publication/ Reprint
1.	Hoffman, A., “Scientific writing and communication”, 2 nd Ed., Oxford University Press.	2014
2.	Katz, M. J., “From Research to Manuscripts: A Guide to Scientific Research”, 2 nd Ed, Springer.	2009
3.	Ebel, H. F., Bliefert, C., and Russey, W. E., “The art of scientific writing”, 2 nd Ed, Wiley-VCH.	2004
4.	Kothari, C. R., “Research Methodology Methods and Techniques”, 2 nd Ed, Vishwa Prakashan.	2006
5	“Chemical safety matters–IUPAC–IPCS”, Cambridge University Press.	1992