Course 1(a): Research Methodology Course

AcSIR-XX-RM	RESEARCH METHODOLOGY	CREDITS 4
Module Title	**Course Content**	
Safety and Behavior at Workspace, Laboratory and Institutional Campus	General safety and accident prevention guidelines, Good personnel safety practices, Laboratory safety practices (Do's and Don'ts), Fire safety principles and fire handling, Care in handling chemicals, Understanding materials safety data sheet (MSDS), Storing and indexing of materials & chemicals, Disposal of materials, chemicals and biological wastes, First aid, Reporting accidents and requisitioning help, Combating accidents. Awareness about members of the Institutional Safety Committee and emergency contact numbers. Lab bench co-operation with colleagues and co-workers, cultivating practice of collectivism, shared responsibilities and team-spirit among fellow researchers, Advancing culture of scientific sharing and discussion in campus and lab.	
Research Problem Identification and Research Design/Plan	Scientific methods, Types of reasoning (Logics) - Induction – Deduction – Abduction, Identifying a topic/area of research, Reviewing literature, Identifying a question to be answered/solution of a problem to be sought, Critically weighing investment (time, money and efforts) to reward (size and scale of answer/solution), Finalizing the research question/problem to be worked on, Cross-disciplinary thoughts and inter-disciplinary research approaches of addressing the question. Design of experiment/research work process and its implementation, Serendipity research.	
Good Experimental, Observational and Data Analysis including Computer Applications	Maintenance of laboratory records & e-Note books, Management of data and self-navigation of research project and academic program progress (objectives, milestone as well as timeline compliance), Data integrity & archiving of observational data for re-tracing, Basic mathematical and statistical treatments of data for appropriate/rational interpretation, Reporting data in inference perspectives, Common computational tools like Process flow diagram, Chemical structure drawing, statistical analyses, Data tabulation and figure presentation (graph, bar diagram, Venn Diagram, heat maps etc.)	
Intellectual Property, Patent Database Search and Patent Writing	Innovation, Intellectual Property Rights (IPR), Pre-IPR system of intellectuality/trade protection: Secrecy/Trade guilds/Cartels, Basic forms of IPRs: ─ Patent, Copyright, Trademark, Designs, Evolution of IP statutes, Major patent databases/offices, CSIR-TKDL, Searching and indexing of patents from different databases, IPR for new technologies, Process patent *versus* product patent, Art of writing a patent/innovation and claims, Preliminary patent, White space mapping, CSIR & its patents strength.	
Writing & Communication of Research Results and Inferences	Scientific writing (including Language proficiency), State-of-the-art scientific literature comprehension, Art and ethics of writing research report/paper, writing of an abstract for scientific community and general public, Skills of making Powerpoint presentations, Art of web-meeting interactions & presentations using latest video-meeting modes. Letter writing and official correspondence.	
Analytical Tools and Techniques in Research - A General Cross-disciplinary Exposure	Flexibility of the contents but it must be within the frameworks of different faculties of AcSIR (Biological Sciences, Chemical Sciences, Physical Sciences, Engineering Sciences, and Mathematical & Information Sciences).	

	Further, the course content should be of basic level to serve the purpose of learning and awareness in a balance of breadth and depth of topics for the students with different backgrounds / interests with respect to subjects and faculties. (*A brief of the tools and techniques to be covered by the Teaching Faculty shall be circulated to the students in advance and the same also shall be uploaded on AcSIR Website*)
CSIR Guidelines (2020) for **"Ethics in Research and in Governance"** Adopted by AcSIR.	Full awareness about the guidelines (https://acsir.res.in/wp-content/uploads/2020/08/OM-Ethics-Guidelines.pdf) and their compliance and practice.

References:

- CSIR Guidelines for Ethics in Research and in Governance - CSIR (2019)
- Ethics in Science Education, Research and Governance- Kambadur Muralidhar, Amit Ghosh, Ashok Kumar Singhvi - INSA (2019)
- Research Design: Qualitative, Quantitative, and Mixed Methods Approaches by John W. Creswell and J. David Creswell
- The Craft of Research by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams
- Research Methodology: A Step-by-Step Guide for Beginners by Ranjit Kumar
- Research Methology : methods and techniques by CR Kothari & Gaurav Garg
- Introducing Research Methodology: A Beginner′s Guide to Doing a Research Project by Uwe Flick

Course 1(b): Research Publication and Ethics

AcSIR-XX-RPE	RESEARCH PUBLICATION AND ETHICS	CREDITS 2
Module Title	**Course Content**	
THEORY		
PHILOSOPHY AND ETHICS	1. Introduction to philosophy: definition, nature and scope, concept, branches 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions	
SCIENTIFIC CONDUCT	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	
PUBLICATION ETHICS	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		
OPEN ACCESS PUBLISHING	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.	
PUBLICATION MISCONDUCT	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.) 1. Use of plagiarism software like Turnitin, Urkund and other open source software tools	
DATABASES AND RESEARCH METRICS	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, ilO index, altmetrics	