

Title of the Course and Course Code	Research Methodology (RM-510)	Number of Credits : 04 Total contact hours : 60
On completion of the course, the students will be able to:		
CO1	Learn the various aspects of the research process, framing useful research questions, research design, data collection, analysis, writing and presentation	
CO2	Understand the research problem, methods/techniques to be adopted	
CO3	Apply statistical tools for analysing the data while performing their research	
CO4	Develop skills in qualitative and quantitative data analysis and presentation	
CO5	Analyse for fitting, errors in the measurements and able to withdraw conclusions from the analysed data	
CO6	Execute a quality research paper and patents in science and technology	

Unit No.	Title of unit and Contents	No. of hours
I	An Introduction to Research Methodology: Objectives, motivation, different types of research, significance, approaches, perception of research , criteria of good research, characteristics of good hypothesis, History of research, Ancient and modern Indian research methodologies.	15
II	Research Process: Literature search and review, defining research topic, plan of work (case study based), maintaining laboratory records (case study based). Safety in Laboratories, Ethical considerations, field data collection, safety in the field.	15
III	Research Data Analysis: Data collection methods, Statistical analyses and its significance, various software tools for statistical analysis, errors in the measurements, Recommended for Arts, languages: creating questionnaires, data analysis from answers.	15
IV	Research Publications: Writing research paper, abstract, project report, making a presentation, writing a research proposal, and intellectual property rights, academic integrity and antiplagiarism.	15

References:

1. 'History of the Scientific Methods' by Martin Shuttleworth, [History of the Scientific Method - How Science Became Important \(explorable.com\)](#)
2. 'The Statistical Analysis of Experimental Data' by John Mandel, Dover Publications (2012).
3. 'Research Methodology Methods and Techniques' by C.R. Kothari, New Age International (P) Ltd. Publishers, 2nd revised edition (2004).
4. 'Handbook of Research Methodology: A Compendium for Scholars & Researchers' by Shanti Mishra & Alok S. Educreation Publishing, (2011).
5. 'Fundamentals of Research Methodology and Statistics' by Singh Yogesh kumar, New Age International Publishers (2006).
6. 'Research Methods: The Basics' by Walliman N., Routledge Taylor and Francis Group (2010).

Instructions:

1. Every department should identify 10 skills out of the following list.
2. There will be continuous evaluation throughout the semester, each skill will be given of only 10 marks. The examination mode is decided by the instructor of that course.
3. There will be no further End Semester Examination (ESE) to be conducted.
4. out of 10 skills, marks obtained in first 4 skills should be submitted as CE (40 marks) and marks obtained in next selected 6 skills be given under ESE (60 marks).

List of skills:

1. Learn to search research paper using authentic database like web of science, science direct, Google Scholar etc.
2. Learn to identify research problem in your domain and write objectives/hypothesis on it.
3. Learn how to write a research outline/plan and present it using MS PowerPoint.
4. Learn to maintain logbook records in the laboratory.
5. Learn data management by data curation and data mining.
6. Write a review of any reference book related to your domain.
7. Write research paper/article review of any one referred or peer reviewed international journal.
8. Learn how to write references like APA/IEEE and format the same using different tools.
9. Plot a graph (line/Bar/Pie) using Microsoft Excel or any other similar software tools.
10. Learn how to write an abstract for research article using Microsoft word and preparation of graphical abstract by Microsoft Power Point or other similar tools.
11. Learn how to check plagiarism for a document using authentic software (Turnitin/Urkund) tools.
12. Learn skills for presentation of a research and project work in competition.
13. Learn to prepare scientific poster & oral presentation in National seminar/workshop.
14. Writing a scientific news article or a science blog.
15. Well aware about conference proceedings and book publications.
16. Write a research proposal for different funding agencies.
17. Adopt skills for participating in group discussions, conferences, symposia, seminar etc.
18. Well-versed with Intellectual Property Rights (IPR) rules.
19. Visit to any research centre and prepare a research report (other than own college research centre).
20. Learn ethical practices for filing patent and publishing in the journal of high repute.