



Faculty of Engineering & Technology

Ph.D Program

ENGINEERING & TECHNOLOGY

RESEARCH METHODOLOGY -SYLLABUS

Total Lecture Hours : 60

Credits: 4

UNIT I –Objectives and types of research

Definition of Research – Importance, limitations - Motivation and objectives – Research methods vs. Methodology. Types of research – Descriptivevs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical,concept of applied and basic research process, criteria of good research.

UNIT II - Research Formulations and Design

Defining and formulating the research problem, selecting the problem, necessity of defining theproblem, importance of literature review in defining a problem, literature review-primary andsecondary sources, reviews, monograph, patents, research databases, web as a source, searchingthe web, critical literature review, identifying gap areas from literature and research database,development of working hypothesis.

UNIT III – Data Collection and Analysis

Computer and its role in research, Effective use of Internet, Execution of the research - Observation andCollection of data - Methods of data collection – Sampling Methods- Data Processing andAnalysis strategies - Data Analysis with Statistical Packages (Sigma STAT,SPSS for student t-test, ANOVA, etc.), - Hypothesis-testing -Generalization and Interpretation.

UNIT IV –Research Ethics, IPR and Scholarly Publishing

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rightsand patent law, commercialization, copy right, royalty, trade related aspects of intellectualproperty



rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability

UNIT-V - Reporting and thesis writing

Structure and components of scientific reports -Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables- Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation –Practice – Making presentation – Use of visual aids - Importance of effective communication.

REFERENCES

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.

Additional reading

1. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
2. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.
3. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.



4. Day, R.A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.
5. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
6. Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.
7. Satarkar, S.V., 2000. Intellectual property rights and Copy right. ESS Publications
8. Epidemiology in medicine, Charles H. Hennekens and Jules E. Burling. (1987)
9. Oxford Text Book of Public Health (5th Edition), volume Oxford University press. (2011)
10. Essentials of Medical Statistics by Bely R. Kirkwood. (2011)
11. An Introduction to biostatistics by P.S.S. Sundar Rau. (2006)
12. National Ethical Guidelines for Biomedical & Health Research involving human participants ICMR, New Delhi 2017
13. Guidelines for care and use of animals in scientific research. Indian National Science Academy, New Delhi.
14. Research Methodology, methods and techniques by C.R. Kothari. (2009)
15. Basic epidemiology, 2nd Edition, R Bonita, R Beaglehole and T Kjellstrom (2007)
16. Statistical methods in medical research, 4th edition, P Armitage, G Berry and JNS Matthews. (2001)
17. Biostatistics: A foundation for analysis in health sciences, 9th edition, Wayne W Daniel (2008)
18. Computer fundamentals Pradip K. Singha and Priti Singha (BPB Publication)
19. The Internet: A users guide K. L. James (PHI publication)
20. Internet Research skill (SAGE publication) Niall O Dochartaigh
21. How to keep your Research Project on Track- Keith Town send - 2018
22. Microsoft office system (PHI publication)