

SCHOOL OF BIOLOGICAL SCIENCES

(Departments: Animal Health and Management, Biotechnology, Bioinformatics, Biomedical Sciences, Botany, Microbiology and Molecular Biology)

ALAGAPPA UNIVERSITY

Syllabus for Pre-Registration Qualifying Entrance Examination for Ph.D. Programme PART-A: RESEARCH METHODOLOGY

UNIT-I: INTRODUCTION TO RESEARCH

Scientific Research - Definition & Significance - Objectives of research - Motivation in research - Understanding research - Selecting the problem - Necessity of defining the problem - Critical & logical thinking - Scientific enquiry - Selection of research topics and justification - Framing the hypotheses and testing - Data collection methods in research.

UNIT-II: RESEARCH PLANNING

Literature review - Primary and secondary sources - Identifying gaps in research - Research Question - Developing a research plan - Sampling design - Research method-Types of Research - Descriptive - Analytical, Applied, Fundamental, Quantitative, Qualitative, Conceptual & Empirical. Hypothesis - Qualities of a good Hypothesis -Null Hypothesis & Alternative Hypothesis - Reliability and Reproducibility of Research.

UNIT-III: STATISTICAL DATA ANALYSIS AND INTERPRETATION

Sampling - Sample Size - Data Preparation - Probability Sample - Descriptive statistics (mean, median, mode & standard deviation)- Inferential statistics (t-tests, ANOVA, chi-square tests, correlation - regression analysis, P- value - Fishers exact test - Wilcoxon rank test- Two-tailed student's- t-test. Mann-Whitney test- Dunnet's two-tailed test - Kruskal - Wallis nonparametric test) - Qualitative data analysis techniques -Data preparation (frequency tables, bar charts, Pie line Graphics & Pie charts) - Testing of Hypothesis and Statistical Inference, Computerized Statistical Package: Use of SPSS.

UNIT-IV: PUBLICATION ETHICS AND INTELLECTUAL PROPERTY RIGHTS (IPR)

Ethics: Introduction to Ethics with respect to science and research - Ethical issues related to publishing: Scientific misconduct: Plagiarism, Fabrication, Falsification, Image Manipulation, Duplicate Publication, Misrepresentation of Authorship, Failure to Disclose Conflicts of Interest, Failure to Obtain Ethical Approval. Predatory publishers and journals-Good Laboratory Practices - Data management in laboratory - Copyright, Royalty, Intellectual property rights and Patent laws - IPR related Issues - trademarks - copy rights - patents.

UNIT-V: WRITING RESEARCH PROPOSAL AND SCIENTIFIC ARTICLE

Basics of report presentation- Content of an Academic Research report - Content on a Research Article - Steps to publish an article - Research Metrics: Significance of Journal Impact Factor, SNIP, SJR, IPP, Cite Score, Metrics: h-index, and i10 index - Components of a research proposal - Research problem statement - research questions - Literature review - theoretical framework - Research plan and timeline.

References:

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3. Garg B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., (2002) An introduction to Research Methodology; RBSA Publishers.
4. Graziano, A., M., and Raulin, M.,L. (2007) Research Methods : A Process of Inquiry; Sixth Edition, Pearson.
5. Kothari C.K.,(2004) Research Methodology- Methods and Techniques; New Age International, New Delhi.
6. Mitchell, K. and Glover, T. (2001) Introduction to Biostatistics; McGraw-Hill Publishing Co., New York.
7. Robert A. Day (1998) How To Write & Publish a Scientific Paper; Oryx Press
8. Willis, J. (2004) Data Analysis and Presentation Skills: An Introduction for the Life and Medical Sciences; Wiley, New Jersey.