

SCHOOL OF BIOLOGICAL SCIENCES

(Departments: Animal Health and Management, Biotechnology, Bio Informatics, Biomedical Sciences, Botany, Microbiology, Molecular Biology and Nutrition and Dietetics)

ALAGAPPA UNIVERSITY

Syllabus for Pre - Registration Qualifying Entrance Examination for Ph. D. Programme

PART A- RESEARCH METHODOLOGY

UNIT-1: 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 hypothesis and testing - Data collection methods in research.

UNIT - II: RESEARCH PLANNING

Literature review - Primary and Secondary sources - Identifying gap 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 of 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 students test - 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 - copyrights - Patent.

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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- Coley, S.M and Scheinberg, C.A., (1990) Proposal Writing; Sage Publications.
- Garg B.L., Karadia, R., Agarwal, F and Agarwal, U.K., (2002) An Introduction to Research Methodology; RBSA Publishers.
- Graziano, A. M., and Raulin, M.L. (2007) Research Methods: A Process of Inquiry; Sixth Edition, Pearson.
- Kothari C.K., (2004) Research Methodology-Methods and Techniques; New Age International, New Delhi.
- Mitchell, K and Glover, T. (2001) Introduction to Biostatistics; McGraw-Hill Publishing Co., New York.
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