



RK University (Pre-registration coursework for PhD program)

Program – PhD (Microbiology)

Concerned Dean – Dr. T. R. Desai (email – trdesai@rku.ac.in)

Sr. No.	Subject	Contents	Method of evaluation	Credits
1.	Research Methodology	As per syllabus mentioned below	Written examination (3 hrs)	4
2.	Subject of specialization: 1. Advanced Techniques in Microbiology	Research topic specific	Written examination (3 hrs)	4
3.	Review of literature	Review of literature for the PhD research topic	Presentation + Detailed report in hard copy	3
Total				11

(*Shall be decided by the Dean of Faculty, individually, for each PhD scholar)

Notes –

1. The admission process of PhD program will comprise of 2 stages viz. (a) admission to PhD program (b) final registration in PhD program.
2. A successful PhD candidate (RAT examination) will be admitted to PhD program after paying admission fees (Rs. 60000/-) and upon allocation of a PhD guide by RK University.
3. An admitted PhD candidate will have to submit synopsis and presentation of his/her actual research project (in consultation with the PhD guide approved and allocated by RK university) before Doctoral Research Committee (DRC) within 6 months from date of admission (date will be declared by university).
4. An admitted PhD candidate will be registered after earning minimum of 11 credits as per above mentioned course-work structure.
5. The candidate will acquire credit of a subject on passing the examination that will be conducted at the end of 6 months (date will be declared by university).
6. On acquiring required credits, an admitted candidate will be issued a certificate of registration (along with project title) by RK University.

Course Title	Research Methodology
Detailed syllabus	
<p>A Research: Meaning, purpose, Types, (Educational, Clinical, Experimental, historical descriptive, Basic applied and Patent oriented Research) and objectives of research, phases of research.</p> <p>B Research Design: Review of Research Literature: Purpose and use of literature review, locating relevant information, use of library & electronic databases, preparation & presentation of literature review, research article reviews, theoretical models and frame work. Identification of gaps in research, formulation of research problem, definition of research objectives.</p> <p>C Documentation:</p> <ol style="list-style-type: none"> a. –How of documentation b. Techniques of documentation c. Importance of documentation d. Use of computer packages in documentation <p>D Research Publication: Thesis, Research paper, Review Article & Technical Reports: Organization of thesis and reports, formatting issues, citation methods, references, effective oral presentation of research. Quality indices of research publication: impact factor, immediacy factor, H- index and other citation indices.</p> <p>E Presentation (especially for oral presentation): Importance and types of different skills, contained, format of model, introduction, Poster, Gestures, eye contact, facial, expressions, stage fright, volume of pitch, speed, pause & language, Visual aids & seating, Questionnaire etc.</p> <p>F Cost analysis of the project: Cost incurred on raw materials, Procedure, instrumentations and clinical trials.</p> <p>G Sources for procurement of research grants: International agencies, government and private bodies.</p> <p>H Industrial-institution interaction: Industrial projects, their feasibility reports, interaction with industries.</p> <p>I Research Ethics and Morals: Issues related to plagiarism, collaborative models and ethics, acknowledgements. Intellectual Property Rights: copy rights, copy left: patents, Industrial designs, Trademarks.</p>	

Reference Books:

1. Research Methodology, Methods & Techniques, C.R. Kothari, Viswa Prakashan, 2nd Edition, 2009.
2. Research Methods- A Process of Inquiry, Graziano, A.M., Raulin, M.L, Pearson Publications, 7th Edition, 2009.
3. How to Write a Thesis:, Murray, R. Tata McGraw Hill, 2nd Edition, 2010.
4. Writing For Academic Journals, Murray, R., McGraw Hill International, 2009.
5. Writing for Publication, Henson, K.T., Allyn & Bacon, 2005.
6. What is this thing called Science, Chalmers, A.F., Queensland University Press, 1999.
7. Methods & Techniques of Social Research, Bhandarkar & Wilkinson, Himalaya publications, 2009.
8. Doing your Research project, Bell J., Open University Press, Berkshire, 4th Edition, 2005.
9. A Handbook of Academic Writing, Murray, R. and Moore, S., Tata McGraw Hill International, 2006

Detailed syllabus

A. Recombinant Techniques

Restriction mapping-RFLP, Cloning strategies, DNA sequencing – manual & automated methods. Southern, Northern, Dot blotting & Hybridization, Polymerase chain reaction-principle, types & applications. Single locus & Multilocus DNA fingerprinting, PCR based DNA fingerprinting –RAPD, AFLP, STRR, DGGE, TGGE,& LTRR analysis.

B. Recent advances in bacterial taxonomy

Polyphasic taxonomy, Phylogenetic backbone & Taxonomic framework for prokaryotic systems, 16-s r-RNA gene sequencing, Fingerprinting, Lipid profiling- FAME analysis.

C. Research Techniques:

Enzyme assay, enzyme activity and specific activity determination. Cell disintegration and extraction techniques, separation of proteins by fractionation (ammonium sulphate, organic solvents). Ion exchange chromatography, molecular sieve chromatography, affinity chromatography, paper chromatography, thin layer chromatography, ultra filtration, Ultracentrifugation. Gel electrophoresis, isoelectric focusing and immunoelectrophoresis, capillary electrophoresis, pulse field electrophoresis. Microscopy, HPLC, HPTLC, GC-MS, FTIR, SEM/TEM, NMR, AAS.

D. Metagenomics:

Metagenomics–culture independent insight—microbial diversity uncultivables, archaea; drug discovery platform—sequence base analysis, function metagenomics, heterologous expression, identifying active clones-screen, selection, functional anchor search *for potential producers*.

E. Bioinformatics:

Gene bank sequence databases-NCBI, EMBL, EBI, DDBJ-retrieving databases entries, sequence alignment & database searching-FASTA, BLAST phylogenetic analysis, secondary & 3D structure, structure prediction using DNA & protein sequence, data processing & publishing.

F. Biostatistics:

Measures of Central tendency and Dispersion. Probability distribution: Binomial, Poisson and Normal. Parametric and Nonparametric statistics, Confidence Interval, Errors; Quantitative Techniques: Levels of significance, Regression and Correlation, Use of Statistics in Biosciences, Use of Computers in Quantitative analysis.

Reference Books:

1. Molecular Biology of the Gene, Michael Levine, James Watson, 5th edition
2. Enzymes. Trevor palmer. 1st edition, Published by Affiliated East-West Press Pvt. Ltd.
3. Molecular Biotechnology. Bernard Glick, 3rd edition, Published by ASM Press.
4. Biotechnology: Fundamentals and Applications, 3rd edition, published by student edition.
5. Principles and Techniques in Biochemistry and Molecular Biology, Wilson and Walker, 7th edition, Published by Cambridge University.
6. Principles of Genetics. Gardener and Simmons, 8th edition. Published by Wiley libraries.
7. Doing your Research project, Bell J., Open University Press, Berkshire, 4th Edition, 2005.
8. Methods in Biostatistics, B.K.Mahajan, 7th edition. Publisher JPB.
9. Bioinformatics: concept, skill and applications, S.C. Rastogi, 2nd edition by CBS press.