MOTHERHOOD UNIVERSITY, Roorkee

ENLIGHTENING WORLD

Doctor of Philosophy (Ph.D.)
COURSE WORK SYLLABUS

FACULTY OF SCIENCES
(Biotechnology)

Implemented from June, 2017 onwards

Roorkee-Dehradun Road, Village Karoundi
Post Bhagwanpur, Tehsil Roorkee
District Haridwar, Uttarakhand

Compulsory Course - I

PAPER I- Research Methodology and Computer Applications

Section I: Research Methodology **Max. Marks: 100**

6 Credits (70 External+30 Internal)

Objective:

- To enable to student to understand and work methods and concepts related Research.
- To enable the student to develop research proposal and to work with research problem.
- To develop broad comprehension of research area.

UNIT –I : Concept of Research **10 hrs (20 Marks)**

Meaning, Concept, nature steps types and characteristics of research., Types and approaches , Ethics in Research and Plagiarism, Scientific Inquiry, Philosophical and Sociological foundations of research, Interdisciplinary approach and its implications in various research area.

Unit II: Types and Methods of Research **10 hrs (20 Marks)**

Qualitative and quantitative methods of research like Descriptive, Historical, Case study, Ethnography, Ex-post facto, documentary and content analysis, survey field and laboratory experimental studies. Characteristics of methods and their implications in research area.

Unit III: Development of research proposals **10 hrs (20 Marks)**

Research proposal and its elements, Formulation of research problem-criteria of sources and definition, Development of objectives and characteristics of objectives, Development of hypothesis and applications.

Writing a Research Paper, Choosing a Topic, Preparing a Working Bibliography, Outlining and need to write a Research Paper

Unit IV: Methods of data collection & data analysis **10 hrs (20 Marks)**

Concept of sampling and other concepts related to sampling. Probability and non-probability samples, their characteristics and implications. Tools of data collections, their types, attributes and uses. Redesigning, research tools-like questionnaire, observation, interviews, scales and tests etc.

Analysis of qualitative data based on various tools. Analysis of quantitative data and it presentation with tables, graphs etc. Statistical tools and techniques of data analysis-measures of central tendency, dispersion. Decision making with hypothesis testing through parametric and non-parametric tests.

Validity and delimitations of research findings.

Section II: Computer Applications

Unit V: **20 hrs (20 Marks)**

Basic Knowledge of Computer, Use of Internet for Research Purpose: E-mail, WWW, Web browsing, acquiring technical skills, drawing inferences from data, Use of technology and other equipment in Research, Research publishing tool-MS Word, Adobe acrobat, Graphics tool-MS Excel, Presentation tool-MS Power, Data Analysis Software and Analysis Techniques point. Application of Internet in research : INFLIBNET, Use of Internet, sights (DOAJ), Use of E Journals, Use of E library, use of EBSCO HOST online database of Academic Libraries.

References:

- Best, J.W. (1995) & Kahan, J.V. – Research Education, Prentice Hall of India Pvt. Ltd., New Delhi.
- Edwards, A.L. (1960) – Experimental Design in Psychological Research, New York, Holts (revised Ed.).
- Ferguson, G.A. and Takane Yoshio (1989) – Statistical Analysis in Psychology and Education.
- Garrett, H.E. (1986) – Statistics in Psychology and Education, Vikils Feffers and Simmons Pvt. Ltd.
- Kaul Lokesh (1984) – Methodology of Educational Research, Vikas Publishing House Pvt. Ltd., New Delhi.
- Sukhiya, S. P. : Melhotra P.V., Elements of Educational Research, New Delhi, Allied Publishers.
- Tuckman, B.W. (1972) – Conducting Educational Research, Harcourt Brace, Javanovich.
- Verma, An Introduction to Educational and Psychological Research, Bombay, Asia Publishing House.
- Lindquist, E.F. (1960) – Elementary Statistical Methods in Psychology and Education, Oxford Book Company, New Delhi.
- Sharma, A.R. (1984) Fundamentals of Educational Research, Loyal Book Depot, Meerut.
- Sanders, D.H., Computer Today, NY: McGraw Hill, 1981
- Sinha, P.K., Computer Fundamentals, New Delhi: BPB Publications, 1992
- Cox, J. And Urban, P. “Quick Course in Microsoft Office. Galgotia Publications, New Delhi,
  1990.
- Jain, Satish: “Introduction to Computer Science and basic Programming.” BPB Publications,
  New Delhi, 1990.
- Rajaraman, V., “Fundamental of Computers”, Prentice Hall of India, New Delhi, 1996.
- Saxena, S., “A First Coursein Computers”, Vikas Publishing House Pvt. Ltd., New Delhi,
  1998.

COURSE WORK SYLLABUS
CORE PAPER –II
Recent Trends In Biotechnology

Total Credits : 6 **Max. Marks 100**

UNIT I: BASIC TECHNIQUES IN MOLECULAR BIOLOGY
Isolation and purification of RNA , DNA (genomic and plasmid). Analysis methods for RNA, DNA. Enzymes in recombinant DNA technology. Genomic and cDNA library construction and screening. DNA sequencing methods, strategies for genome sequencing.

UNIT II: CLONING IN MICROORGANISMS AND HIGHER ORGANISMS
Vectors in Molecular Biology. Molecular cloning of DNA or RNA fragments in Prokaryotic (E.coli, Bacillus) and eukaryotic systems - plasmid, phage, cosmid, BAC and YAC vectors. Direct and indirect gene delivery techniques. Gene transfer in plants, Expression of recombinant proteins using bacterial, animal and plant vectors. Fusion proteins.

UNIT III: GENETIC MARKERS IN MOLECULAR BIOLOGY
DNA finger printing, RFLP, RAPD and AFLP techniques. Somatic cell nuclear transfer, Polymerases chain reaction types and applications, DNA foot printing, Site directed mutagenesis.
UNIT IV: APPLICATIONS OF MODERN TECHNIQUES
New drugs/ Therapies for genetic diseases- combating infectious disease. Metabolic engineering, DNA vaccines. Protein sequencing methods, detection of post translation modification of proteins. Identification of protein by MALDI-TOF, yeast two and three hybrid system-phage display

UNIT V: ADVANCED TECHNIQUES IN BIOTECHNOLOGY
Microarray, Chromosome Engineering, Targeted gene replacement. Current status of stem cell research. Gene Knockout, Gene Silencing techniques (Antisense technology & RNAi).

Reference:
1. Bowtell, D and Sambrook, J.DNA Microarrays: A Molecular cloning manual. CSHL press
2. Glick, BR., Pasternak, JJ (1998) Molecular Biotechnology: Principles and Applications of recombinant DNA, ASM Press.
3. Grandi ,G (2004) Genomics, Proteomics and Vaccines. Wileypress.
4. Hannon, GJ, RNAi: A guide to gene silencing. CSHLPress
5. Kirby, LT (1990) DNA finger printing: An introduction, Stockton press.
6. Lewin, B (2004).Genes VIII. Pearson P- rentice H all Press
7. Principles of genetic manipulation; Ed. Old and Primrose, 6th Edition. Blackwell Science publication