

ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ



# University of Mysore

(Estd.1916)

**Ph. D. in MOLECULAR BIOLOGY**



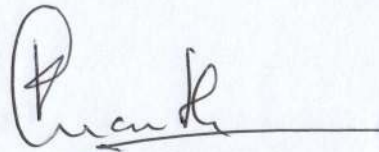
UNIVERSITY OF MYSORE

Department of Studies in Molecular Biology

Manasagangotri, Mysuru-570 006

Regulations and Syllabus

Ph. D. in MOLECULAR BIOLOGY



**Chairman**

**Board of Studies in Molecular Biology**

**University of Mysore**

**Manasagangotri, MYSURU-570 006**

**INDIA**



**UNIVERSITY OF MYSORE**

**GUIDELINES AND REGULATIONS**

**LEADING TO**

**PH. D. IN MOLECULAR BIOLOGY**

**Programme Details**

Name of the Department	:	Department of Studies in Molecular Biology
Subject	:	Molecular Biology
Faculty	:	Science and Technology
Name of the Programme	:	Ph.D.

**DEPARTMENT OF STUDIES IN MOLECULAR BIOLOGY  
UNIVERSITY OF MYSORE**

**PH.D. IN THE SUBJECT MOLECULAR BIOLOGY**

The Ph.D., programme in Molecular Biology is a upcoming subject and becoming popular among life sciences in the University.

**Programme objectives**

The main objective of this Ph.D programme is to provide strong foundation to

- To understand the basic problems in current research scenario and find meaningful solutions.
- To develop as an independent researcher both in academic institutions and in R & D programmes of industries.
- To take up research problems at higher level to work as a postdoctoral fellow worldwide.
- To take up teaching profession in academic institutions

**Programme Outcomes**

On successful completion of this programme each Ph.D scholar will:

- Have through knowledge of current literature in the specified area.
- Know how design experiments to address the chosen research problem.



- Have confidence to write publications in the peer reviewed Journals.
- Have knowledge to take up any research problem independently.
- Have required knowledge to teach post-graduate students.

## **Pedagogy**

- The instructional design comprises of developing good organisational skills of researchers in order to evolve a good research design in the area of research.
- Scholars pursuing PhD research should have intellectual mastery over their chosen area of study within Molecular Biology and allied disciplines.
- Conducting literature survey under the direction of the supervisor is a primary module in the research methodology.
- Participatory learning on surveys and conducting experiments under the supervision of teachers are adopted.
- Practical orientation on Sample survey data organisation and interpretation through statistical techniques is yet another major method of approach in the pedagogy.
- Evolving proper conclusions and propose possible recommendations for furtherance of knowledge in the subject and field of specialisation chosen by the research scholar.

## **MOLECULAR BIOLOGY PH.D. COURSE WORK (2018-19)**

### **COURSE-I : RESEARCH METHODOLOGY**

#### **Objectives are:**

- To learn types of research.
- To learn about various research models with the use of advanced techniques
- To learn about good laboratory practices and ethical issues.
- To learn the applications of suitable statistical analysis.

#### **Course outcome the research student will:**

- Understand the use of appropriate biological samples or animal model to address the selected research problem
- Understand the applications of advanced techniques.
- Understand the signaling pathways at cellular levels.

**Introduction:** Characteristics of Research in Biological Sciences - Types, Process of Research - Research plan and its components - Methods of Research (Survey, Observation, case study,



experimental, historical and comparative methods) - Difficulties in Biological research. Identification and formation of research problem (Hypothesis). Elements in research methodology: Research design (completely randomized design - CRD, Research by Design - RBD, Limit States Design - LSD).

**Research Proposal and experimental design:** Key elements- Objective, Introduction, Design or Rationale of work, Guidelines for design of experiments, Material and methods, Designing biological experiments, Compilation and documentation of data; characteristics of a good experimental design, basic principles of experimental design

Good laboratory practices. ethical (including Animal ethics), legal, social, scientific and intellectual Property right issues in Biological science.

Major research institutes related to life sciences in India. Brief information about government Research agencies such as DBT, DST, ICMR, CSIR, UGC, DRDO, DAE and ICAR etc.

**Statistical applications:** Probability, Binomial, Poisson and Normal Distributions (areas method only) including problems. Definitions and applications of Chi-square test, 't' and 'F' test. Analysis of variance with linear models. Analysis of variance for one-way and two way classified data, multivariate analysis.

**Research Report:** Recording research data: field note book, Hand written Laboratory Note Bok, Writing and presentation: Format of research paper and style of writing the report, Authorship issues: multiple authors and corresponding authors, Procedure of Reference Citation; Significance of writing research papers and review articles; Major scientific publishers; Impact factor and citation index; Effective presentation of research findings. Writing research abstract, need and characteristics of abstract. Reviewing the research article.

**Plagiarism**-Definition, consequences, forms of plagiarism and related issues.

Biosafety measures in biological laboratories, biohazards and infectious biological agents, Radioisotope handling and disposal.

Regulatory guidelines for biological research involving living modified organisms and their products – Institutional Bio-safety Committee (IBSC), Review Committee on Genetic Manipulation (RCGM), Genetic Engineering Appraisal Committee (GEAC), Monitoring cum Evaluation Committee (MEC), recombinant DNA advisory committee (RDAC), Recombinant Drug Advisory Committee (RDAC). State Biotechnology Coordination Committee (SBCC), District Level Committee (DLC).

Computer applications in biological science - Scientific database: Science Direct and Pubmed. Introduction to graphic software, manuscript preparation, project report preparation and scientific evaluation of published article. Ethical considerations when altering digital images.

Bioinformatics: analysis of molecular biology data using novel bioinformatics tools Computational Methods for Life Sciences.

Bioinformatics - Gene therapy – pathway regulatory networks – drug discovery – management of chemical libraries Microarrays genes in metabolic pathways – microarrays in drug toxicity testing and metabolic pathways. Mining proteomics, new approaches in proteomics.

Exercises: Project proposal preparation and defending, review of paper, write and publish review article.



## **COURSE-II : RESEARCH METHODOLOGY SYLLABUS**

### **Objectives are:**

- To work with research guide in scientific spirit.
- To know the current literature of the selected research problem.
- To learn about good laboratory practices and ethical issues.

### **Course outcome the research student will:**

- Understand how to work in a research group.
- Understand the use of scientific literature to support his research.
- Understand the importance of plagiarism and authorship issues.

**Responsibility of the guide:** The Guide shall ensure that the research student understands the following aspects. The Guide shall conduct tests/evaluation from time to time and have the IA marks ready.

### **Current status of the lab:**

- 1) Ongoing projects/ past projects/ publications resulting from the Guide's Research group. Any novel technique developed. The review of the literature pertinent to candidates work- relevant publications. Identification of Research problem, identifying gaps in the knowledge, formulating objectives and work plan.
- 2) **Review of the allied fields-** Literature of the allied area to candidate's field, outstanding publications.
- 3) **Authorship issues-** the primary author, corresponding author, contributing author, etc., Guide's responsibility to assign the appropriate authorships.
- 4) **Plagiarism-** adopting a figure v/s cut and paste and its implications in plagiarism.
- 5) **Sharing reagents/ chemicals/ methods in lab-** team work is essential.

**How to publish/ present in seminars/ symposia/ meeting proceedings/ etc.,**

## **REFERENCES**

### **Research methodology Introduction:**

- Yogesh, K.S. 2006. Fundamental of Research Methodology and Staistics, New Age International Publishers, New Delhi. 314 pp.
- Kotahri, C.B. 2004. Research Methodology: Methods and Techniques, New Age International Publishers, New Delhi, 401 pp.





### **Biosafety Regulatory guidelines:**

- <http://dbtbiosafety.nic.in/> - committees
- Guidelines and handbook of IBSCs. Prepared by department of biotechnology, in association with biotech consortium india, Ltd. New delhi. 2<sup>nd</sup> revised edition may 2011.
- WHO – Biosafety Guidelines.

### **Biostatistics:**

- John h. McDonald, 2009, Handbook of biological statistics, sparky house publishing, 313 pp.
- Hogg, R.V., Craig, A., Mckean, J.W. 2004. Introduction to Mathematical Statistics, Prentice-Hall, U.K.

### **Bioinformatics:**

- Primrose, S.B. and Twyman, R.M. 2003. Principles of Genome Analysis and Genomics: 3<sup>rd</sup> edition, Blackwell Publishing Company, Oxford, UK.
- Liebler, D.C. 2002. Introduction to Proteomics – Tools for the New Biology, 1<sup>st</sup> Edition, Humana Press Inc., New Jersey, USA.
- Orengo, C.A., Jones, D.T. and Thornton, J.M. 2003. Bioinformatics – Genes, Proteins and Computers, 1<sup>st</sup> Edition, BIOS Scientific Publishers Limited, Oxford, UK.
- Mount, D.W. 2001. Bioinformatics – Sequence and Genome Analysis, 1st Edition, Cold Spring Harbor Laboratory Press, New York, USA.
- West Head, D.R., Parish, J.H. and Twyman, R.M. 2003. Instant Notes Series – Bioinformatics, 1<sup>st</sup> Edition, Viva Books Private Limited, New Delhi, India.
- Ignacimuthu, S. 2005. Basic Bioinformatics, 1<sup>st</sup> Edition, Narosa Publishing House, New Delhi, India.
- Lesk, A.M. 2002. Introduction to Bioinformatics, 1<sup>st</sup> Edition, Oxford University Press, Oxford, UK.



