Dr. V.S. KRISHNA GOVERNMENT DEGREE & P.G. COLLEGE (A)
(An Autonomous institution Affiliated to Andhra University)
Reaccredited by NAAC with "A" Grade (3rd Cycle)
Nodal Resource Center & Research and Development Cell
Maddilapalem, Visakhapatnam - 530013, Andhra Pradesh

Add-on Course on

RESEARCH METHODOLOGY

DEPT OF ZOOLOGY

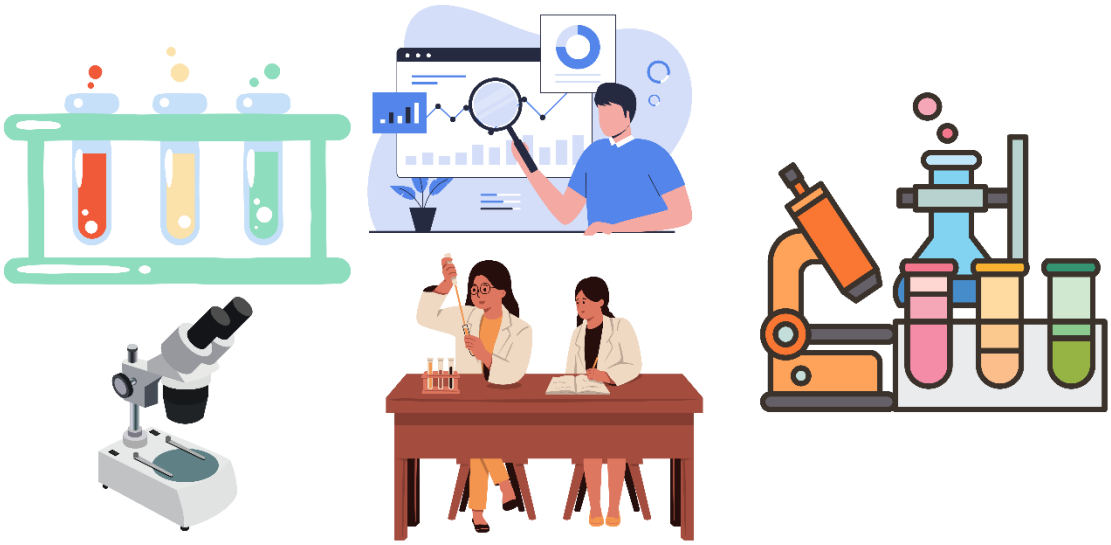
Dr. V. S. Krishna Govt. Degree & PG College (A)

Add-on Course

2021-22

Title: RESEARCH METHODOLOGY

DEPARTMENT OF ZOOLOGY



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0891-2553262, https://www.drvskrishnagdc.edu.in

PERMISSION LETTER TO START ADD-ON COURSE

From
The Head of The Department,
Department Of Zoology
Dr. V. S. Krishna Govt. Degree College (A)

To
Principal,
Dr. V. S. Krishna Govt. Degree College (A)

Sir,

Sub: Permission to start an Add-on course for 2021-22 and permission to nominate the Zoology faculty to teach classes for the add on course - regarding

Ref: Resolution copy of the department of Zoology Dated 14-10-2021

As per the resolution of the department of Zoology, we are very much glad to start add-on course entitled **"Research Methodology"** for the B.Sc (CBZ) & M.Sc. (Zoology) students. In this regard, I request your kind self to accord permission to start the Add on course and also permission to teach theory and practical classes for the said add - on course.

Thanking you sir

Course Coordinator

HOD
Department of Zoology

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DEPARTMENTOF ZOOLOGY

Add-on Course for 2021-22

RESEARCH METHODOLOGY

Introduction:

A research methodology certificate course typically covers the principles and practices of designing, conducting, interpreting, and communicating research studies. The objective of the course is to provide participants with the fundamental skills and knowledge needed to design and execute research projects effectively.

This is a 2 Credits Course with 60 hours of duration. The course will enable the students to develop basic methodology for their project and research studies. The mission of the course is to impart research skills to the beginners and help improve the quality of Research by the existing researchers.

This course is usually offered at the graduate or postgraduate level to improve their expertise in research methods. The course covers basics of research design options, data analysis, statistical analysis, and ethical considerations in research in addition to some of the research techniques that a UG and PG student can employ in order to carry out a project.

The Course Structure is designed in a way that the learning of Research Methodology can move from Mugging up syndrome to fun-practical method; from a teaching process to an experimental process and from competitive learning to collaborative learning.

The Participants of the course will start the course by reading the provided literature at the end of the course they will find themselves equipped enough to author a book or two themselves with the protocols offered to them specifically designed for live practical sessions with plant/animal tissues.

Goals and Objectives:

- to verify and test important facts by employing the statistical tools
- to prepare solutions and reagents
- to design a research topic with the techniques learnt during the course
- to develop new scientific tools, concepts and theories to solve and understand scientific and nonscientific problems
- to find solutions to scientific, nonscientific and social problems and
- to overcome or solve the problems occurring in our every day life.

Course objectives: at the end of the course, the student

- shall be familiar with various statistical tools
- shall be able to maintain cleanliness of various glassware used in research studies
- shall have a hands-on exposure to various scientific instruments
- shall have knowledge on research ethics
- will be able to understand the concept of IPR and patenting

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Department of Zoology Add-on-course (w.e.f.2021-22)

Course Title: RESEARCH METHODOLOGY

Hours: 60 **Max. Marks: 100**

AIM OF THE COURSE

To equip students / researchers with research methodology essential for pursuing research degrees and inculcate a spirit of research among UG and PG students

LEARNING OBJECTIVES

- Identify the role and importance of research in life sciences
- To design a research topic
- To develop solutions for identified problems in the field of science
- To give students hands-on experience with scientific instruments available in the college
- To make the students set goal for furthering their studies in research

COURSEOUTCOMES:

The overall course outcome is that the student shall develop deeper understanding of feed quality and feed ingredients. This course will provide students with a deep knowledge in aqua culture feeds. By the completion of the course the graduate shall able to –

- **CO1**- Students who complete this course will be able to understand and comprehend the basics in research methodology
- **CO2**– Students shall be able to applying the methodology in carrying out a research/ project work.

- **CO3**– Get hands-on experience of various instruments.
- **CO4**–Shall be able to read, comprehend, and explain research articles in their academic discipline
- **CO5**– Knowledge on and importance of Ethics, IPR and Patenting involved in research

CO–PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	✓				✓		✓		✓
CO2	✓		✓			✓	✓	✓	✓
CO3		✓				✓		✓	✓
CO4	✓				✓		✓	✓	
CO5				✓	✓		✓	✓	✓

SYLLABUS

Unit -1:- Introduction to Research Methodology, Data Collection, Analysis and Testing of Hypothesis

Meaning of Research, Objectives of Research, Criteria of Good Research, Designing of Research, Perform literature reviews using print and online databases, Writing of Research Proposal, Survey, Sampling, Measures of Central Tendency, Correlation, Regression, ANOVA, t-Test and f-Test

Unit -2:- Glassware, Solutions and Buffers

Glassware - Types of glassware used in Research, Autoclaving
Solutions and Reagents – Preparation of Stock Solution, Molar/Normal/Formal Solutions
Buffers – Acids, Bases, Buffers, pH

Unit -3:- Instrumentation

Hands-on training in Microscopy, Electronic Weighing Balance, pH Meter, Colorimeter, Centrifuge, Spectrophotometer, Laminar Air Flow

Unit -4:- Techniques

Electrophoresis – Agarose and SDS-PAGE, Chromatography – Paper and Thin Layer, Tissue Culture technique, Preparation of Culture Media

Unit -5:- Ethics in Research and IPR

Research Ethics - Introduction, Overview, and Research Misconduct, rules and regulations in India; Regulatory Guidelines for Research in Biology - Regulation for research using animals (CPCSEA), stem cells (DBT), microorganisms, GMO (Biosafety), plants (National Biodiversity Authority)

Intellectual Property Rights - Historical perspective, characteristics and nature; World Intellectual Property Organization (WIPO); Forms of IPR - Copyright, Trademark, Patents

Practicals

1. Problems on measures of central tendency
2. Preparation of molar, normal and formal solutions
3. Preparation of buffer solutions and testing the pH using pH meter
4. Designing a project and execution using the techniques learnt in the course
5. Problems on IPR and Patents

Suggested Reading

1. Research Methodology: Methods and Techniques: C.R. Kothari
2. Fundamentals of Statistics: S.C. Gupta
3. Statistics for Research Students: Erich C. Fein, John Gilmour, Tanya Machin & Liam Hendry
4. Techniques and Methods in Biology: Ghatak K.L.
5. Principles and techniques of Biochemistry and Molecular Biology: Wilson and Walkers
6. Buffer solutions: The basics: Robert J. Beynon
7. Research design: John W Cresswell

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BLUEPRINT FOR SEMESTER END EXAMINATIONS PAPERSETTING

Learning Level-wise Weightage				
Bloom's Taxonomy level	**Weightage**	**marks**	**Essay type**	**Short answer type**
Knowledge/ Remember	33%	24	1	1 (1 out of 2)
Understanding/ Comprehension	27%	20		1 (1 out of 2)
Application/	20%	24	1	1 (1 out of 2)
Analysis	13%	16		11 (1 out of 2)
Synthesis/Evaluate	7%	16	1	2 (2 out of 4)
Total	100	100	3 questions	6 questions

S. No.	**Module/ Chapter**	**Name of the chapter**	**50 Marks (MCQs)**
1	Module-I	Unit-**I**	25 marks
2	Module-II	Unit-**II**	20 marks
3	Module-III	Unit-**III**	25 marks
4	Module-IV	Unit-**IV**	30 marks

Note: The questions with internal choice should be of same Bloom's level.

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Department of Zoology
Add-on course
Course Title: Research Methodology

Time: 3 Hours **70 M**

MODEL PAPER

I. *Answer any FOUR of the following:* *5***4x5= 25**
Draw labeled diagrams wherever necessary

1. Anova
2. Autoclave
3. Laminar Air Flow
4. Electrophoresis
5. CPCSEA
6. WIPO

.SECTION–B

II. ***Answer any THREE of the following:*** **3x15 = 45**
Draw labeled diagrams wherever necessary

1. Explain the measures of central tendency in brief.

   (or)

   Explain the procedure for preparation of protein stock solution using bovine serum albumin.
2. Describe methodology employed in animal cell culture using laminar air flow.

   (or)

   Write the principle and procedure with regards to separation of proteins using SDS PAGE.
3. Explain briefly various regulatory guidelines for research in biology.

   (or)

Explain different forms of Intellectual Property Rights.

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Department of Zoology
Add-on course
Course Title: Research Methodology - Practical

Time: 1 1/2 Hours **30 M**

MODEL PAPER

1. Problem / Case study related to Biostatistics - 10M
2. Chromatography / Electrophoresis / Spectrophotometric experiment ---- 10M
3. Problem on preparation of solutions / reagents ----- 5 M
4. Record & Viva-Voce---- 5M

External Examiner **Internal Examiner**

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