Ph. D. COURSE SYLLABUS

DEPARTMENT OF BIOTECHNOLOGY

2019 Onwards

SCHOOL OF BIOLOGICAL SCIENCES

DR. HARISINGH GOUR VISHWAVIDYALAYA

SAGAR-470003 M. P.

PhD course, Session 2019-20

Ph. D. Course Work: Minimum of 20 credits should be completed as follows in one semester

Paper	Code	Title	Credits
Paper I	Core course SBS CC 141	Research Methodology	4
Paper II	Core Course BIT CC 502	Instrumentation	4
Paper III	Elective Course One (1) BIT SE 503 (2) BIT SE 504	Biotechnology Techniques and Applications Cell and Molecular Biology	4
	BIT CC 505	Review of Published Research	8
		Total	20

CC- Core Course
SE- Self Elective

School of Biological Sciences

Core Course Code BIT C 501 Title: Research Methodology

Total Credits: 4 (60 hrs)

Course content:

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Unit-1 (Zoology) **12 hrs**

Hypothesis and Research Design: Defining, formulating and development of research hypothesis. Testing and development of working hypothesis. Types of research (descriptive, analytical, applied, fundamental, qualitative, conceptual and empirical) and research methods. Importance of literature review in defining a problem. Thrust area and innovation.

Unit-2 (Botany) **12 hrs**

Computer Applications in Biological Research: Basics, Programmes (microsoft excel, word, power point) and software (SPSS) used in research. Networking and modelling. Data mining and interpretation by use of computer. Data respository in knowledge bank (Gene Bank, Shodh Ganga, INFLIBNET etc.)

Unit-3 (Botany, Zoology, Microbiology and Biotechnology) **12 hrs**

Scientific Presentation and Writing: Structure and components of scientific reports, Types of scientific reports and their preparation, review, paper and thesis writing. Bibliography, referencing and citation for scientific writing.

Unit-4 (Biotechnology) **12 hrs**

Basic Principle and Application of Sophisticated Instruments used in Biological Research: Microscopy (Confocal, Phase contrast, TEM, SEM), Centrifuge, Chromatography, Spectroscopy, Immunochemical Techniques (ELISA), Electrophoresis (DNA, Protein), PCR (Routine and real time).

Unit-5 (Microbiology) **12 hrs**

Biosafety and Good Laboratory Practices: International standards and concepts of biosafety, bio safety levels and biohazards. Chemical and radiological hazards. Removal and disposal of biohazards. Concepts of good laboratory practices, safety related with genetically modified organisms.

Core Course Code BIT E 502 Title: Instrumentation

Total Credits: 4 credits

(Instructor: Dr. C. P. Upadhyaya)

Course content:

1) pH determination
2) Spectrometry
3) Chromatography
4) Electrophoresis
5) Centrifugation
6) Gene sequencing
7) Proteomics
8) Microscopic techniques
9) Blotting techniques
10) ELISA
11) Flow cytometry

Practical will be based on the theory content

Elective Course Code BIT E 503 Title: Biotechnology Techniques & Applications

Total Credits: 4 credits

(Instructor: Dr. R. Anupam)

Course content:

1) Brief introduction and history of Biotechnology
2) Concept of recombinant DNA technology particularly in molecular cloning
3) Tissue culture techniques: plant and animal
4) Animal biotechnology: transgenic and knockout animals, animal disease models and animal model systems
5) Plant biotechnology: Development of transgenic plants and their application in various areas
6) Applications of biotechnology

Practical will be based on the theory content

Elective Course Code BIT E 504 Title: Cell and Molecular Biology

Total Credits: 4 credits

(Instructor: Prof. Subodh Jain)

Course Content

1) Introduction to genetic material, genes and gene products and functions
2) Investigating protein interactions
3) RNA structure-function studies
4) Cancer biology
5) siRNA technology
6) Southern, Northern and Western blotting
7) Current trends in molecular and cell biology

Practical will be based on the theory content

Code BIT C 505 Title: Review of Published Research

Total Credits: 8 credits (Instructor: Prof. Subodh Jain)

The student will prepare a draft of a review under the supervision of a teacher allotted.