

**HEMCHANDRACHARYA
NORTH GUJARAT UNIVERSITY**

DEPARTMENT OF LIFE SCIENCES

M. PHIL. PROGRAMME

IN

LIFE SCIENCES

(w.e.f. 2011-2012)

STRUCTURE OF M. PHIL. LIFE SCIENCE**MARKING SCHEME**

	SUBJECTS	MAX. MARKS	
		INTERNAL	EXTERNAL
Semester - I	MP – 101 : Methods in Life Sciences Research	30	70
	MP – 102 : Dissertation (Assignment, Seminar, Review Presentation)	100	-
	MP – 103 : Subjective Elective MICROBIOLOGY) MICROBIAL GENOMICS AND TECHNOLOGY	30	70
	MP – 104 : Subjective Elective (ENVIRONMENTAL SCIENCE) ADVANCES IN ENVIRONMENTAL SCIENCE		
	MP – 105 : Subjective Elective (BOTANY) ADVANCES IN BOTANY		
Semester – II	MP – 201 Scientific Paper Writing	30	70
	MP – 202 : Dissertation	50 (Viva)	150
TOTAL		240	360

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - I

MP – 101 : Methods in Life Sciences

4 Credit

Unit : I Concept of Research

- 1.1 Basic understanding and significance of research in life science
- 1.2 Selection and formulation of research problem
- 1.3 Types of Research
- 1.4 Experimental design

Unit : 2 Research Methodologies

- 2.1 Classical Methods of research: Historical, institutional, legal, philosophical, ethical and comparative methods.
- 2.2 Modern methods of literature survey, sampling, questionnaire, Case studies, Observation, interview, group discussion, experimental methods.
- 2.3 Data collection techniques : Types of data, sampling design, Organization and reproduction of data
- 2.4 Data Analysis : Qualitative and Quantitative analysis, Formation and testing Hypothesis, Data management, SPSS as a tool for statistical analysis

Unit : 3 Spectroscopy and Electrophoresis

- 3.1 **Spectroscopic methods:**
Optical spectroscopy: Spectrophotometer, UV-Vis spectrophotometer, Atomic Absorption Spectrophotometer
- 3.2 **Electrophoresis:** Agarose, SDS, 1D & 2D Gel electrophoresis iso electric Focussing.

Unit : 4 Microscopy and Chromatography

- 4.1 **Microscopy :** Compound, Phase contrast, fluorescence, and Electron Microscopy

4.2 **Chromatography** : Paper, Thin layer, GC, HPLC, HPTLC, Column

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - I

MP – 102 : Dissertation

(Assignment, Seminar, Review Presentation) 4 Credit

- Each student shall prepare a review of the research that he/she is pursuing in the programme. The student shall have to prepare a review of literature of the dissertation and the following submissions are also to be made under this course.
 - Presentation about the dissertation being pursued
 - Justification of Aim and Objectives
 - Review of Literature
 - Formation of research hypothesis

- The student shall have to submit an assignment in this paper
- The student has to give at least one seminar to the Master degree students
- The internal evaluation shall be done considering the assignment , review of literature presentation and the seminar presentation.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - I

MP – 103 : Subjective Elective (MICROBIOLOGY)

4 Credit

(MICROBIAL GENOMICS AND TECHNOLOGY)

Unit : I GENOMICS:

Prokaryotic and Eukaryotic microbial diversity : Isolation, cultivation and preservation of microorganisms, microbial symbiosis : Criteria for classification and identification of microbial species : Morphological, Physiological & Biochemical, Numerical taxonomy. Molecular taxonomy : & Phylogeny

Unit : 2 Gene Technology:

Genetically modified organisms. Application of Gene technology. Advantage in transgenic technology

Functional Metagenomics:

Functional metagenomics- Heterologous expression- Search for potential producers- Polyketide synthesis, White biotechnology- screening- Environmental Gene - screening for industrial enzymes- Bioactive molecules- synthons- Putative gene products. Single cell Metagenomics.

Unit : 3 Microbial Technology:

Production of useful products through the microbial and recombinant microbes - Insulin, vaccines, antibiotics, SCP (Spirulina and mushroom) and Biofertilizers (*Cyanobacteria*, *Azospirillum*, VAM) Biodegradation of organic waste and xenobiotic compounds- heavy metals, pesticides, insecticides. Microbial leaching. Microbial fuels - hydrogen production. Biodiesel - Biodegradation of oils and petroleum products. IPR and patenting biological materials. National and international patent laws. Biosafety regulations and Bioethics.

Unit : 4 Nanobiotechnology and Bioinformatics:

History of biotechnology; Terminology of nanotechnology; Nanoparticles; Nanotubes; Nanowires; Microbial production of nanoparticles - Silver, Gold and Cadmium. Therapeutic application of nanoparticles. Side rophores and magnetosomes. Social and ethical implication of nanoscale science. Genome sequence comparison, alignment and database searching. Genebank - NCBI, EMBL and DDBJ-retrieving sequence. Tools used for phylogenetic analysis- Ribosomal database BLAST, FASTA , Phylip. RNA structure prediction, Restriction enzyme patterns, Designing primers and probes. DNA barcoding. Submission of rDNA sequences- Bankit and Sequin guidelines.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - I

MP – 104 : Subjective Elective (ENVIRONMENTAL SCIENCE) 4 Credit

ADVANCES IN ENVIRONMENTAL SCIENCE

Unit : 1 Understanding the Environment and Environmental Crises :

- Basics of environment and scope of environmental science research
- Current earth's environment and challenges
- Environmental crises and its impact on human life
- Issues related to environment degradation in India and scope of research

Unit : 2 Carbon offset Management :

- Understanding global warming and climate change
- Factors affecting global climate change
- Carbon offset mechanism
- Current carbon offset management in india

Unit : 3 Developments in Aquatic Environment Research :

- Assessing surface water qualities
- Monitoring aquatic biodiversity
- Monitoring ground water pollution
- Water resource management in urban environment

Unit : 4 Advance techniques for Environmental Science :

- Remote Sensing
- Geographic Information Systems (GIS)
- Habitat assessment, monitoring and management

- Biodiversity assessment techniques

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - I

MP – 105 : Subjective Elective (BOTANY)

4 credit

ADVANCES IN BOTANY

Unit : 1 Plant Hormones: Control of Development :

- Occurrence, structure, biosynthesis, functions and mechanisms of role of auxins, gibberellins, cytokinines, ethylene and ABA in plant.
- Hormonal induced signal Perception, transduction and gene expression.
- Hormonal control Senescence and Abscission.
- Commercial application of natural and synthetic plant growth regulators.

Unit : 2 Plant Biotechnology and Genetic Engineering :

- Transgenic plants and their role in agriculture.
- Methods of gene transfer:- Direct gene transfer methods - electroporation- microinjection- biolistics – PEG mediated – liposome mediated and plastid transformation. Indirect gene transfer – Agro bacterium mediated gene transfer.
- Crop protection:- Development of pathogen, herbicide and stress resistance plant
- Molecular farming, production of antibodies, vaccines, polymers and bioplastics.

Unit : 3 Plant Tissue Culture :

- Basic concept of tissue culture :- Lab designing, criteria for media preparation explant selection and sterilization
- Types of cultures:- Callus, suspension, organ, meristem culture and micro propagation.
- Protoplast culture:- Isolation, culture, fusion and its applications.
- Synthetic seeds :- Production of synthetic seed, encapsulation or coating of synthetic seed, their uses and limitations.

Unit : 4 Medicinal Botany and Phytochemistry :

- Medicinal and Aromatic Plants – Scope, importance and plants as source of drugs and phytochemicals.

- Drugs of botanical origin :- structure and physical properties and chemistry of secondary metabolites (phenols, glycosides, saponins, steroids, alkaloids, flavonoids, terpenoids).
- General methods for screening secondary metabolites.
- Approaches and strategies for ex-situ and in-situ conservation: botanical garden, arboreta, herbal garden and field gene bank.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester- II

MP – 201

Scientific Paper Writing

4 Credit

Unit : 1

1.1 What is Scientific Writing?

- The need for clarity; Language of a scientific paper.

1.2 Origins of scientific writing

- The early history; The IMARD story

1.3 What is a scientific paper

- Definition of a scientific paper; Organization of a scientific paper

Unit: 2

2.1 How to write the introduction

- Suggested rules; Reason for the rules; Citations and Abbreviations

2.2 How to write the title

- Importance; Length of the title; Need for specific titles; Importance of syntax;
The title as a label; Series titles

2.3 How to write the abstract

- Definition; Type of abstracts; Economy of words

Unit: 3

3.1 Materials and methods selection

- Introducing research methods; Collecting data; Analysis –converting data into introduction

3.2 How to write the results and discussions

- Content of the results; How to handle numbers; Strive for clarity; Avoid redundancy
- Discussion and verbiage; Components of the discussions; Factual relationship
- Significance of the paper; Defining scientific truth

3.3 Coming to a conclusion

Unit: 4

4.1 How to write a review paper

4.2 How to present a paper orally

4.3 How to keyboard the manuscript

4.4 Where and how to submit the manuscript

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY

M.PHIL. (life science)

Semester - II

MP – 202 : Dissertation

8 Credit

- Each student shall be continuing their research that he/she has started in the first semester.. The student shall have to the dissertation thesis embodying the interpretation of the laboratory experiments and submission of the thesis..After submission of the thesis, the evaluation of the same by two referee (i.e. one internal and one external). After receiving the evaluation report, the viva-voce examination shall be conducted. On recommendation of the examiner, the candidate shall be declared successful and the notification for the same shall be published by the university.