DEPARTMENT OF GENETICS
MAHARSHI DAYANAND UNIVERSITY,
ROHTAK-124001, INDIA
('A' Grade State University established under Haryana Act No. XXV of 1975)
Web site: http://www.mdurohtak.ac.in

Ph D Course Work in Genetics

Scheme of Examination of Ph D (Course Work) Examination (Jan,17 to Dec,17)

Paper No.	Nomenclature of the Paper	Theory	Internal Assessment	Seminar presentation	Max. marks
17GENPC1	Research Methodology	80	20*	-	100
17GENPC2	Biostatistics & Computers	80	20*	-	100
17GENPC3	Tools and Tehniques in Genetics	80	20*	-	100
17GENPC4	Review writing and presentation/ Seminar	-	-	100	100

Grand Total= 400

***Internal Assessment:**

Two assignments of 10 marks each

Program specific Outcome

PSO-1 PhD course in Genetics is to provide students the foundations for research in Genetics & to impart the knowledge of basic principles and novel techniques with respect to various aspects of research.
PSO-2 Student will be having ability to explore, formulate and analyze challenges and research problems related to field of genetics
PSO-3 Knowledge and understanding of principles of research.
PSO-4 Ability to design and conduct experiments with novel ideas, to use the techniques, skills, and to analyze and interpret data for PhD programme

SYLLABUS OF COURSE WORK FOR Ph.D. Genetics

17GENPC1: RESEARCH METHODOLOGY

Course outcome

CO-1 Enable the students to understand basic concepts of research and its Methodologies & to organize and conduct research (advanced project) in light of ethical, social & legal considerations.

CO-2 Knowledge of preparing a research project proposal for financial assistance.

CO-3 Well conversed in research problem formulation, hypothesis construction and selection of appropriate research designs.

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain eight to ten short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each of the four units. They will attempt five questions in all.

Max. Marks: 80

Time: 3 Hrs.

UNIT I

Meaning of Research in Biological Sciences - Purpose, Characteristics and Types of Research - Process of Research -Formulation of objectives - Formulation of Hypotheses - Types of Hypotheses - Methods of testing Hypotheses - Research plan and its components - Methods of Research (Survey, Observation, case study, experimental, historical and comparative methods) - Difficulties in Biological research.

UNIT II

Identification and formation of research problem (Hypothesis). Elements in research methodology: Research design (CRD, RBD, LSD). Scientific database: Science Direct and Pubmed.

UNIT III

Ethical, legal, social and scientific issues in Biological Research. A brief idea about the funding agencies such as DST, DBT, ICMR, CSIR and UGC. Role of IPR in Research and Development.

UNIT IV

Writing of Research Proposal, Report and Research Paper: Meaning and types - Stages in preparation - Characteristics - Structure - Documentation: Footnotes and Bibliography - Editing the final draft-Evaluating the final draft- Checklist for a good proposal/report/research paper.

Basic knowledge of organizing conferences, symposia, workshop, exhibition etc.

Books Recommended:

- Research Methodology- G.R. Basotia and K.K. Sharma.
- Research Methodology- C.H. Chaudhary, RBSA Publication

17GENPC2: BIOSTATISTICS & COMPUTER

Course outcome

CO-1 Familiarization of students about the elementary biostatistics and computer

CO-2 Students will be having knowledge biostatistics and will be able to do data interpretation during Thesis/Paper writing.

CO-3 Knowledge of computers will enable students to write PhD synopsis, thesis and preparation of presentations (oral/poster) for conferences at national and international level.

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain eight to ten short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each of the four units. They will attempt five questions in all.

Max. Marks: 80
Time: 3 Hrs.

UNIT I

Variables in Biology, Collection, classification and tabulation of data. Frequency distribution, Diagrammatic and Graphical presentation of statistical data, Sampling techniques. Specific applications of measures of Central tendency, Dispersion, Skewness and Kurtosis in research. Measures of Relationship: Correlation – Simple, Partial and multiple- Regression- Simple and multiple-Association of Attributes – applications in research.

UNIT II

PROBABILITY: - Meaning, Fundamental Concepts, Approaches to measurement of Probability, Random experiments, sample space, events. Mathematical definition of probability of an event. Use of permutations and combinations in calculation of probability.

PROBABILITY DISTRIBUTIONS: - Distribution of binomial, poisson and normal variables and their fittings only Binomial, Poisson and Normal, (areas method only) Distributions (including problems).

UNIT III

Sample statistics and parameters, population null hypothesis, level of significance. Definitions and applications of Chi-square test,'t' and 'f' test.

Meaning of analysis of variance with linear models. Analysis of variance for one-way classified data, analysis of variance for two-way classified data

UNIT IV

Computer Basics: Course introduction, MS Windows basics, UNIX basics, File management, E-mail (PINE, EUDORA, Internet mail), File Transfer (ftp, WSftp).

Office Applications: MS Office 2000/XP including MS Word, MS Excel, MS Power Point.

Books Recommended:

- Elements of Biostatistics in Health Science- W. Daniell.
- Statistical Methods for Research: S. Singh et al (1988) Central Publishing Ludhiana.
- Fundamental of Statistics – D. N. Enhance.
- Statistical Methods: S.P. Gupta. S. Chand Publication
- Fundamentals of Biostatistics- Khan and Khanna, Ukaz Publication
- Biostatistical analysis- Zerold and Jar.

17GENPC3: Tools and Techniques in Genetics

Course outcome

CO-1 Will be helpful in doing in-depth study of principles and applications of various Instruments and techniques critically required during PhD and research.
CO-2 Student will be able to execute the protocols/methodologies related with biophysical methods, purification of biomolecules.
CO-3 Conversant in computational techniques used in various experiments in Genetics and related subjects.

Instructions for paper setter

There will be a total of nine questions. Question No. 1 will be compulsory and shall contain eight to ten short answer type questions without any internal choice and it shall cover the entire syllabus. The remaining eight questions will include two questions from each unit. Candidates will be required to attempt one question from each of the four units. They will attempt five questions in all.

Max. Marks: 80
Time: 3 Hrs.

Unit-I

General Principles of gene cloning: Isolation and purification of DNA, RFLP analysis, DNA fingerprinting and its application, Principles and techniques of nucleic acid hybridization and cot curves, sequencing of nucleic acids, Southern, Northern and Western blotting techniques, Preparation of probes, Polymerase Chain reaction, RT-PCR, Methods for measuring nucleic acid and protein interaction.

Unit - II

Biophysical methods: Analysis of biomolecules using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy, Crystallography, Structure determination using X-ray diffraction and NMR, Different types of mass spectrometry and surface plasma resonance methods, Protein sequencing.

Unit - III

Bioseparation techniques: Principle & application of gel filtration, ion exchange & hydrophobic interaction chromatography, thin layer chromatography, gas chromatography; High pressure liquid chromatography (HPLC), Fast Protein Liquid Chromatography, Electrophoresis (agarose and page); Isoelectric-focussing (IEF); Ultracentrifugation (Velocity and buoyant density).

Unit – IV

Radio labeling techniques: Properties of different types of radioisotopes normally used in biology, their detection and measurement; incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines

Computational methods: Nucleic acid and protein sequence databases; data mining methods for sequence analysis, web-based tools for sequence searches, motif analysis and presentation.

Suggested Books:

1. Molecular cloning A Laboratory Manual 3rd edition Vol. 1, 2, 3- Sambrook and Russell, Churchill press, 2007
2. Principals and Techniques of Biochemistry and Molecular Biology, Edited by Keith Wilson and John Walker, Sixth Edition, Cambridge University Press.

17GENPC4 REVIEW WRITING AND PRESENTATION/SEMINAR

Marks: 100

Course outcome

CO-1 Will train students to do research on a particular topic by selecting high quality articles or studies that are relevant, meaningful, important and valid and summarizing them into one complete report.

CO-2 It will provide an excellent starting point for researchers to begin research in a new area by forcing them to summarize, evaluate, and compare original research published in scholarly journals, books, Govt. reports & web sites in that specific area.

CO-3 Review presentation will enable the student to create slides by combining the text, graphics, narrations, transitions and other features that contain information on a topic. Linking and embedding techniques with MS Word, Excel and Access.d multimedia to support a presentation will be learnt by the researcher

Each student will submit a review report on any general topic of Genetics or area of interest in genetics and he has to give a presentation/seminar of the same.
