DEPARTMENT OF GENETICS
FACULTY OF INTERDISCIPINARY & APPLIED SCIENCES
UNIVERSITY OF DELHI SOUTH CAMPUS

Syllabus for Ph.D course work

The department will offer the following three papers for Ph.D course work

Paper I (PGEN01): Advances in Genetics – I
Paper II (PGEN02): Advances in Genetics –II
Paper II (PGEN03): Research Methodology
Dissertation

PGEN01 and **PGEN02** are aimed at introducing to the students the salient features of several model systems, highlighting their utility in genetics and genomics research. They will also be updated on the advances in both basic and applied aspects of contemporarily significant areas in genetics, genomics and biotechnology research across life sciences.

PGEN03 is aimed at teaching the essentials to fresh M.Phil. Students to train them in the appropriate methods that they should inculcate early on in their scientific pursuit. It is proposed to teach this course in an interactive mode and taking in-house examples. It is projected to follow mainly a continuous evaluation mode for this paper based on assignments and presentations.

Evaluation: All three theory papers will have components of end semester examination and continuing evaluation. The total marks for each paper will be 100. A student has to score 50 marks to pass a paper. The distribution of marks will be as follows:

	Total marks (100)		
Paper	**End semester examination**	**Continuing Assessment**	**Credits**
PGEN01	70	30	4
PGEN02	70	30	4
PGEN03	50	50	4

PGEN01: Advances in Genetics – I (4 Credits)

- **Revisiting concepts in genetic**s: variations, segregation, independent assortment, gene interactions, linkage, recombination and genetic maps

16 lectures

- ***Saccharomyces cerevisiae***: A hotbed for discovery of basic biological processes in eukaryotic cells; Metabolic switching and adaptation as a connection between yeast and cancer formation; A tool to study longevity; Discover platform for numerous genomic technologies, A model for studying pathogenic yeast

12 lectures

- ***Dictyostelium discoideum***: Classical experiments; Genome organization; Starvation-induced development - morphogenesis, cell movement, chemotaxis, cell differentiation and pattern formation; Signaling molecules and its influence on cell differentiation; A model for various cellular processes and in understanding the shared pathological mechanism of disease (human neurodegenerative diseases and intracellular bacterial pathogens)

12 lectures

- ***Drosophila melanogaster***: Tools for genetic analyses, studying developmental processes and cell signaling, disease modeling and analyses

12 lectures

- **Microbial pathogenomics:** Genome organization of plant pathogens; genomic tools to understand evolution of pathogenesis in plant microbes; Evolution of virulence determinants- gene duplication, horizontal gene transfer and genome reduction

12 lecture

PGEN02: Advances in Genetics – II (4 Credits)

- **Plant genetics and breeding:** Natural breeding systems; Concept of gene pool; Haploidy and polyploidy and their implications in breeding; Breeding methods; Genetic basis of heterosis and their exploitation in development of hybrid varieties; Molecular plant breeding - molecular markers in genome and gene mapping, QTL analysis, marker assisted breeding, map-based cloning of genes

18 lectures

- **Biotechnological approaches for crop improvement**: Plant cell and tissue culture techniques and their applications in agriculture; Gene transfer in plants; Transgenic plants and genome editing for crop improvement; Biofortification; Biopharming; RNA silencing and its applications in plants

18 lectures

- **Medical genomics**: Genetic variation (Chromosomal, SNPs, Indels, CNVs) in health and disease; Human Genome Project; Human Genome mapping methods - Physical mapping (Chromosomal banding through Next Generation sequencing) and Genetic mapping (Linkage analysis using RFLP/MS/SNP markers); Applications of mapping-linkage/association mapping for disease gene identification in monogenic and complex disorders; Diagnostic genetics, Genetic counseling; Functional genomics

14 lectures

- **Cancer biology:** Genetic and epigenetic basis of cancer; Methods and models in cancer research; Updates on cancer therapy

14 lectures

PGEN03: Research Methodology (4 Credits)

- **Identifying a broad research area:** Basic versus applied; Narrowing down to a sub-area

2 lectures

- **Relevant scientific literature search:** Importance and methods (including choice of key words); Learning to distinguish between original work, repetitive work and validation study

2 lectures

- **Framing a research question:** Identification of lacunae in the research area of interest; Hypothesis generation; Defining the aims/objectives; Revising objectives at a later date

2 lectures

- **Designing a realistic research strategy including alternate strategy;** Study design**,** Importance of - inclusion of negative and positive experimental controls, biological and technical replicates, single and double blind studies, coding/anonymisation of samples, statistics based sample size determination prior to finalization of study design

6 lectures

- **Recording observations:** Importance; Methods of transparent and systematic record keeping; Maintenance of laboratory work books – hard and soft copies; Storage of data including taking regular backups

4 lectures

- **Organization and analysis of observational/experimental data:** Hypothesis testing, hypothesis generation, unbiased analysis, importance of looking beyond the obvious, serendipitous findings, independent cross-validation of data; Interpretation of data

6 lectures

- **Presentation of data:** Raw and analyzed data; Methods- Graphic, pictorial, tabular, oral, poster

16 lectures

- **Scientific writing**: Abstract, synopsis, concept note, full length research proposal, research paper, research thesis; Importance and styles of citing references

16 lectures

- **Safety in research:** Handling of biohazardous substances, disposal of biohazardous waste; Biosafety issues- Chemical, radiation, recombinant DNA, biological material

2 lectures

- **Research ethics:** Honesty, acknowledgement of contributions, authorship issues, plagiarism, fraud

  2 lectures
- **Regulatory bodies in research:** Institutional ethics committee, Institutional biosafety committee, Animal ethics committee

  2 lectures
- **Debatable issues in applied research:** Genetically modified foods; Ethical, legal and social issues in biomedical research

  2 lectures
- **IPR issues in research**

  2 lectures

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UNIVERSITY OF DELHI SOUTH CAMPUS
DEPARTMENT OF GENETICS

August 21, 2017

Members of the Departmental Research Committee discussed the following matters related to Ph.D. program in Genetics:

1. Fresh Ph.D. registration
2. Ph.D. Confirmation
3. Request for Maternity leave
4. Request for six months extension of Ph.D. term
5. Syllabus for Ph.D. course work
6. Any other matters

1. Fresh Ph.D. Registration

The applications of the following candidates were considered in the meeting for admission to Ph.D. course in Genetics. The details of the candidates are summarized in Annexure I.

S.No.	Name	Gender	Category
1	Ritika Kapila	Female	General
2	Khanchuila Shingnaisui	Female	ST

The committee recommended admission of the above students to the Ph.D. Programme, and forwarding the applications to BRS for further necessary action

Further the committee proposed that Ms. Ritika Kapila be recommended for University NON-NET fellowship.

2. Confirmation of Ph.D. registration

Applications submitted by following students for confirmation of their Ph.D. registrations were considered. It was noted that the students have successfully completed their course work. DRC recommended the confirmation of registration and forwarding the applications to BRS for approval.

S.No	Name	Registration No.	Date of Registration
1.	Aparajita Choudhury	1147	19/1/2017
2.	Navneesh Yadav	1152	19/1/2017
3.	Priyanka	1153	19/1/2017
4.	Ruby Tiwari	1148	19/1/2017
5.	S. Hamsa	1150	19/1/2017
6.	Shweta Tandon	1151	19/1/2017
7.	Upasana Bhattacharyya	1149	19/1/2017

3. Request for Maternity leave

The request for maternity leave from 1st October to 31st January 2018 (four months) by Ms. Latika Bhayana registered on 3rd January 2013 was considered, approved for forwarding to BRS for necessary action.

4. Request for Extension of Ph.D. term

Applications submitted for 6 months extension by the following students were considered, recommended and forwarded to BRS for necessary action.

I. Cancellation of Registration

The following cases were considered and approved for cancellation of registration, as per recommendations of the respective DRCs:

Sr.No.	Name of the Candidate	Department
1.	Ms. Shilpa Rohra	Microbiology
2.	Ms. Varsha Verma	Biochemistry
3.	Mr. Ankit Pal	----do----
4.	Ms. Pritam Sharma	Electronic Science

J. ANY OTHER MATTER

(i) Application for Maternity Leave:

Application recommended by the respective Supervisors/DRC was considered favorably and recorded.

Sr.No.	Name of the Student	Department	Leave Period
1.	Ms. Latika Bhayana	Genetics	1st Oct 2017 to 31st Jan 2018

(ii) Syllabus of Ph.D. course work:

Syllabus of Ph.D. course work from the Department of Genetics and Plant Molecular Biology recommended by the respective DRC was considered favorably and recorded in the BRS.

(iii) Leave Application:

Applications recommended by the respective Supervisors/DRC were considered favorably and recorded.

Sr.No.	Name of the Student	Department	Leave Period
1.	Ms. Richa Babbar	Plant Molecular Biology	28th Aug 2017 to 30th December 2017

(iv) Extended absence without any intimation of Ph.D. student:

The observation of the DRC (PMB) that the following student has been absent from work since March 2017 was recorded. Further, it was also noted that the last extension given to the student was over on 28th July 2017 after completion of 6 years following which she has not requested for any further extension. Thus she automatically ceases to be a Ph.D. student.

Sr.No.	Name of the Candidate	Department
1.	Ms. Indu Tokas	Plant Molecular Biology