

SYLLABUS FOR Ph.D. COURSE WORK



**DEPARTMENT OF PLANT MOLECULAR BIOLOGY
FACULTY OF INTERDISCIPLINARY & APPLIED SCIENCES
UNIVERSITY OF DELHI, SOUTH CAMPUS
NEW DELHI – 110 001
INDIA**

**DEPARTMENT OF PLANT MOLECULAR BIOLOGY
FACULTY OF INTERDISCIPLINARY & APPLIED SCIENCES
UNIVERSITY OF DELHI SOUTH CAMPUS**

SYLLABUS FOR Ph.D. Course Work

The department offers two papers (PMB I and PMB II) for Ph.D. course work. These two papers are also open for students from other departments under FIAS. Each paper will be of 4 credits and the credit assigned to Ph.D. course work shall be a minimum of 8 credits and a maximum of 16 credits. The Ph.D. students of Department of Plant Molecular Biology can also opt for courses in allied subjects being offered by other departments affiliated to FIAS. A student shall be required to complete the coursework within initial one or two semesters. A paper on 'Research Methodology' is compulsory. The courses to be opted by students in each semester should be in consultation with the Research Advisory Committee and with concurrence of the Departmental Research Committee (DRC).

Details of Papers:

The research methodology paper is based on literature survey, instrumentation, core techniques in molecular biology, computer application, data search, and presentation and writing skills. The other course is aimed at introducing the students to advances in the field of plant molecular biology and plant biotechnology.

S. No.	Code of the Paper	Name of the Paper
1.	PMB I	Research Methodology
2.	PMB II	Advances in Plant Molecular Biology and Biotechnology

Evaluation Criteria:

The papers will have components of end-of-semester examination and continuous evaluation or internal assessment. The criteria for internal assessment shall be decided by the Coordinator and the teachers involved in teaching the respective courses. Students shall be required to attend a minimum of two-third of the lectures delivered in individual papers. The maximum marks for each paper are 100 and a student must score at least 55 marks to pass a paper. The distribution of marks is as follows:

Code of the Paper	Offered in Semester	Maximum Marks (100)	
		End-of-semester Examination	Internal Assessment
PMB I	Semester I (July-Nov)	70	30
PMB II	Semester II (Jan-May)	70	30

PMB I: RESEARCH METHODOLOGY

1. **Instrumentation** -- Basic techniques in Microscopy, Spectroscopy, Spectrometry, Centrifugation, Electrophoresis (gel and chip), Biacore, Gene gun (biolistic), related topics. *8 lectures*
2. **Core Techniques of Molecular Biology** -- Cloning vectors, Cloning methodologies, PCR and its modifications, Gene expression studies, Bimolecular interaction studies, Next Generation Sequencing (NGS) methodologies, Protein sequencing, related topics. *12 lectures*
3. **Literature Survey** -- Reading and interpretation of research papers, Critical analyses of research problems, Research design, Sampling, Patent search, related topics. *3 lectures*
4. **Computer Applications** -- Basics of Computer Operating System: basics of UNIX and Linux commands, Using Windows, Directory structures, Command structure (Document preparation, EXCEL, Power Point Presentation), Scientific editing tools, related topics. *6 lectures*
5. **Database Search & their Utilities** -- Data mining and analysis, preparation and interpretation. *2 lectures*
6. **Introduction to Biostatistics** -- Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis, Cross tabulations, t-test, Chi-square test, correlation, SPSS, p-value, ANOVA (analysis of variance), cluster analysis, related topics. *8 lectures*
7. **Presentation Skills** -- Oral and written presentations, Hand-outs and Brochures, Paper and grant writing skills, Thesis writing tutorials, Project work (drafting a research paper or a project work), related topics. *4 lectures*
8. **Ethics in Science** -- Copyright, Royalty, Intellectual property rights and Patent laws, Reproduction of published material, Plagiarism, Citation and acknowledgements, Reproducibility and accountability, Conflict of Interest, related topics. *5 lectures*
9. **Research Seminars on Related Topics** *14 lectures*

PMB II: ADVANCES IN PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY

1. **Unifying Concepts in Light and Hormone Signal Transduction in Plants** -- Diversity of sensory receptors and their evolutionary significance; Two-component sensor-regulator system; Light- and hormone-regulated signaling. *5 lectures*
2. **Forefronts of Calcium Signal Transduction in Plants** -- Calcium as “Hub and Nodal point” in multiple signaling (biotic and abiotic stress); Development of calcium signaling networks with advanced tools and techniques. *5 lectures*
3. **Plant Development** -- Model systems; Developmental differences between animals and plants; Early plant embryogenesis. Patterning and molecular mechanisms of differentiation. *5 lectures*
4. **Gene Regulatory Networks Controlling Flower Development** -- ABCDE model of flower development; Floral initiation and meristem specification; Male and female reproductive development. *5 lectures*
5. **Bioinformatics** -- Biological Databases; Sequence alignment, phylogenetic analysis; Generation and analysis of whole genome data, Whole genome annotation taking examples of major plant genomes. *5 lectures*
6. **Small RNA-mediated Gene Regulation** – Types of non-coding RNAs: Sequencing, detection and validation, Mechanism of action and biological roles; Artificial microRNA (amiR) and siRNA technology. *5 lectures*
7. **Plant Biotechnology and Production of Transgenics for Resistance to Varied Abiotic Stresses** -- Conventional plant breeding, molecular breeding and transgenic science; Tools and techniques for production of transgenic plants; Developing transgenic plants for resistance/tolerance to abiotic stresses. *5 lectures*
8. **Interaction of Plants with Viruses** -- Organization, functions and dynamics of viral genes; Viral promoters; RNA-interference and viral infections; Viral suppressors and their role in pathogenesis; Virus-induced gene silencing; Development of transgenic virus resistance in crops. *5 lectures*
9. **Regulation of Fruit Ripening and Quality Addition and Role of Plants as Bioreactors** -- Role of ethylene; Genes manipulated for delayed ripening; Improvement of folate, lycopene and flavor compounds. Strategies for high-level expression, down-stream processing; Humanization of plant expressed products, few success stories. *5 lectures*
10. **Molecular Breeding and IPR-related Issues** -- Molecular markers; Marker-assisted breeding (MAB) and molecular-assisted selection (MAS); IPR-related issues, trade marks, copy rights, patents, geographical indicators. *5 lectures*
11. **Research Seminars on Related Topics** *14 lectures*

BOARD OF RESEARCH STUDIES
FACULTY OF INTER-DISCIPLINARY AND APPLIED SCIENCES
UNIVERSITY OF DELHI SOUTH CAMPUS

MINUTES

A meeting of the Board of Research Studies, Faculty of Inter-Disciplinary and Applied Sciences, was held on 25th August 2017, at 3:00 pm, in Director's Committee Room, Director's Office, South Campus. The following members attended the meeting:

Sr. No.	Name	Department
1.	Prof. P. K. Burma	Genetics (Chairperson)
2.	Prof. Paramjit Khurana	Plant Molecular Biology
3.	Dr. Surekha Katiyar-Agarwal	----do----
4.	Prof. Avinashi Kapoor	Electronic Science
5.	Prof. Mridula Gupta	----do----
6.	Dr. Sangeeta Srivastava	----do----
		(Rajdhani College)
7.	Dr. Tapasya Srivastava	Genetics
8.	Dr. Subhendu Ghosh	Biophysics
9.	Dr. Manisha Goel	----do----
10.	Prof. Rani Gupta	Microbiology
11.	Prof. Swati Saha	----do----
12.	Dr. Yogender Pal Khasa	----do----
13.	Prof. D.P. Sarkar	Biochemistry
14.	Prof. Suman Kundu	----do----
15.	Dr. Amita Gupta	----do----
16.	Dr. Garima Khare	----do----
17.	Dr. Sandeep Tiwari	Physical Education & Sports Sciences
18.	Dr. S.J. Basumatary	----do----
19.	Dr. J.P. Sharma	----do----
20.	Dr. Sanjeev Singh	IIC

The following members could not attend the meeting due to prior commitments:

Sr. No	Name	Department
1.	Prof. Vani Brahmachari	VC's Nominee
2.	Prof. Anil Grover	Plant Molecular Biology
3.	Dr. Saurabh Raghuvanshi	----do----
4.	Dr. P. Koteswara Rao	Electronic Science
5.	Prof. B.K. Thelma	Genetics
6.	Dr. Anita Kapila	Microbiology (Gargi College)
7.	Dr. Sarita Nanda	Biochemistry (Daulat Ram College)

At the outset the Chairperson welcomed all the members and proceeded with the agenda.

- A. The Minutes of the last meeting of the Board of Research Studies held on 13th April 2017 were confirmed.
- B. The members discussed the issue of recognition of supervisor/co-supervisor within and outside the University. It was decided that the issues of recognition should be taken up at the level of DRC and DRC should forward application of Ph.D. student to the BRS, after having recognized the supervisor.
- C. The BRS was apprised of a communication send to the Chairperson from a member of the DRC, Department of Electronic Science. The main issue was regarding increase in number of seats in the Ph.D. program after it was notified in the Bulletin of Information. The Chairperson shared the contents of the letter and the responses received from the Head of the Department of other colleagues of the department. The Head has clarified in his response that this increase was in view of the new Ph.D. ordinance which allowed college teacher to be supervisors. He had also written to the research council about the issue, and the research council had permitted the increase in view of having new supervisors under the latest Ph.D. ordinance. The members thus unanimously agreed to the increase in number of Ph.D. seats in the department of Electronic Science.
- D. Application of the following candidate recommended by the, DRC's of the department was considered for registration to Ph.D. program and approved for Provisional Admission. (Annexure-I for details)

Sr.No.	Name of the Candidate	Department
1.	Ms. Juhi Jain	Microbiology
2.	Ms. Pallavi Gulati	---do---
3.	Ms. Arushi Khanna	---do---
4.	Ms. Shilpa Mohanty	---do---
5.	Ms. Vandana Padmanabhan	---do---
6.	Ms. Janki	Biochemistry
7.	Ms. Nikita Goswami *	---do---
8.	Ms. Neha Lalwani	---do---
9.	Ms. Neha Panwar	---do---
10.	Ms. Rita Singh	---do---
11.	Ms. Nupur	---do---
12.	Mr. Rajeshwar Patle	---do---
13.	Mr. Nikhil Bhalla	---do---
14.	Ms. Aakanksha Kadam	---do---
15.	Ms. Sumedha Saluja	---do---
16.	Ms. Deepali Dhaka	IIC
17.	Mr. Amit Birwal #	---do---
18.	Ms. Ritika Kapila	Genetics
19.	Ms. Khanchuila Shingnaisui	---do---
20.	Mr. Aishwarye Sharma	Plant Molecular Biology

21.	Ms. Barkha Ravi	----do----
22.	Ms. Harsha Samtani	----do----
23.	Ms. Lisha Khungar	----do----
24.	Ms. Ragini Singh	----do----
25.	Mr. Ringyo Jajo	----do----
26.	Ms. Sanchi Bhimrajka	----do----
27.	Ms. Swati Kumari #	Electronic Science
28.	Mr. Ishwar Pandey	----do----
29.	Ms. Preeti Singh	----do----
30.	Ms. Monika Sharma	----do----
31.	Ms. Hina Yadav #	----do----
32.	Ms. Priyanka Pandey	----do----
33.	Mr. Narendra Gangwar	----do----
34.	Mr. Ajay Kumar Visvkarma #	----do----
35.	Mr. Anshu Rastogi	----do----
36.	Ms. Shikha Swaroop Sharma	----do----
37.	Ms. Neha	----do----
38.	Mr. Pawan Kumar	----do----
39.	Mr. Himanshu Kushwah	----do----
40.	Mr. Jyoti Prasad Nath *	----do----
41.	Ms. Suleshma Katiyar	----do----
42.	Mr. Praveen Pal	----do----
43.	Mr. Sangeeta Yadav *	----do----
44.	Mr. Dharmendra Kumar Mahato *	----do----
45.	Mr. Manoj Kumar	----do----
46.	Mr. Ajit Singh *#	----do----
47.	Mr. Rakesh	----do----
48.	Mr. Akash	----do----
49.	Mr. Manohar Singh	----do----
50.	Mr. Prashant Chaudhary	----do----
51.	Mr. Shri Bhagwan	DPESS
52.	Mr. Anurag Sharma	----do----
53.	Ms. Meenu Dabas	----do----
54.	Ms. Neha Baghel *	----do----
55.	Ms. Parul Saini	----do----
56.	Ms. Basanti Naik	----do----
57.	Mr. Abhishek Goyal	----do----
58.	Mr. Ashish Kumar *	----do----
59.	Mr. Pritish Khare	----do----
60.	Ms. Charanjeet Kaur	----do----
61.	Ms. Sudha Pandey	----do----
62.	Ms. Anchal	Biophysics

* To be admitted following submission of renewed OBC certificate.

Co-supervisor to be approved following receipt of No Objection Certificate from the Institute/University.

- E. The application of (i) Mr. Vikram, (ii) Ms. Babita from DPES was not approved by BRS as the DRC of DPES had recommended registration only after clarification on whether the candidates are subject to verification of their M.P.Ed. degree and criteria of admission to M.P.Ed. as per NCTE norms. Further in case of Ms. Babita no supervisor was allotted.
- F. The Progress Reports of the following Ph.D. students and recommendation of the DRC of the respective departments were discussed and their registrations were confirmed:

Sr. No.	Name of the Student	Department
1.	Ms. Varshini Sharma	Microbiology
2.	Ms. Babbal	---do---
3.	Ms. Jyoti Pal	---do---
4.	Ms. Ashima Dua	---do---
5.	Ms. Aparjita Choudhury	Genetics
6.	Mr. Navneesh Yadav	---do---
7.	Ms. Priyanka	---do---
8.	Ms. Ruby Tiwari	---do---
9.	Ms. S. Hamsa	---do---
10.	Ms. Shweta Tandon	---do---
11.	Ms. Upasana Bhattacharyya	---do---
12.	Ms. Ankita Prusty	Plant Molecular Biology
13.	Ms. Bhoomika	---do---
14.	Ms. Shipra Singh	---do---
15.	Ms. Rinchuila Shimphrui	---do---
16.	Ms. Vaishali	---do---
17.	Ms. Manju Rani	Electronic Science
18.	Mr. Avashesh Dubey	---do---
19.	Mr. Ajay Pratap Singh Gahlot	---do---
20.	Mr. Mohit Kumar	DPES
21.	Mr. Parveen Singh Rathi	---do---
22.	Rajiv Godara	---do---
23.	Mr. Naveen Kumar	---do---
24.	Mr. Ashwani Kumar	---do---
25.	Ms. Kumari Seema	---do---
26.	Mr. Pardeep Kumar	---do---
27.	Ms. Neetu Singh	---do---
28.	Mr. Vikas Rathee	---do---
29.	Mr. Alok Sharma	---do---
30.	Mr. Tribhuvan Ram Narayan	---do---
31.	Mr. Sagar Pathak	---do---
32.	Ms. Kirti	---do---
33.	Ms. Jyoti Mishra	---do---
34.	Mr. Madhusudan Singh	---do---
35.	Mr. Ravinder Kumar	---do---
36.	Mr. Raghvendra Shukla	---do---

37.	Mr. Sajjad Ahmad Bhat	----do----
38.	Mr. Praveen	----do----
39.	Mr. Manish Hooda	----do----
40.	Mr. Vikas Tomer	----do----
41.	Mr. Jitendra Singh	----do----
42.	Mr. T. Daniel Tuikangh Koren	Biophysics
43.	Ms. Shumaila Iqbal Siddiqui	----do----
44.	Ms. Deeksha Pandey	----do----

G. Change in title of the Ph.D. thesis of the following candidates, as recommended by their respective DRCs, were considered and approved. (See Annexure-II for details)

Sr.No.	Name of the Student	Department
1.	Ms. Shivani Sharma	Biochemistry
2.	Ms. Kusum Rawat	Electronic Science
3.	Ms. Swati Sharma	----do----
4.	Mr. Sachin Kumar	----do-----
5.	Ms. Abhishikha Srivastava	Biophysics
6.	Ms. Bandana Kumari	----do----

H. The requests duly recommended by respective DRCs, for extension of registration period of the Ph.D. students seeking first 6 months extension were considered and approved by the BRS.

(1st Extension; for 6 months after completion of 5 years)

Sr.No.	Name of the Student	Department	Extension Period
1.	Mr. Nambram Somendro Singh	Microbiology	12 th July 2017 to 11 th Jan 2018
2.	Ms. Vaishali Verma	Biochemistry	12 th July 2017 to 11 th Jan 2018
3.	Ms. Priyansha Singh	Genetics	16 th Nov 2017 to 15 th May 2018
4.	Ms. Swati Sharma	Electronic Science	12 th July 2017 to 11 th Jan 2018
5.	Mr. Davinder Kaur	----do----	12 th July 2017 to 11 th January 2018
6.	Mr. Ved Vrat Verma	Biophysics	23 rd Aug 2017 to 22 nd February 2018

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	1 st Oct 2017 to 31 st 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	28 th Aug 2017 to 30 th 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. Further, it was also noted that the last extension was recorded 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.

Sr.No.	Name of the Candidate	Department	Absent from
1.	Ms. Indu Tokas	Plant Molecular	March 2017

K. REPORTING ITEMS**(i) Application for personal visit to Hong Kong:**

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

Sr.No.	Name of the Candidate	Department	Joining Date
	Ms. Aakriti Singal	Biochemistry	18 th July 2017 to 22 nd July 2017

(ii) Application for Leave:

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

Sr.No.	Name of the Student	Department	Leave Period
1.	Ms. Swati Sharma	Electronic Science	5 th Jan 2017 to 19 th May 2017
2.	Mr. Sachin Kumar	Electronic Science	2 nd Jan 2017 to 19 th May 2017

(iii) Application for rejoin the department:

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

Sr.No.	Name of the Student	Department	Date of Joining
1.	Mr. Joginder Singh	Electronic Science	20 th February 2017
2.	Ms. Shikha Srivastava	Biophysics	1 st August 2017

(iv) Application for rejoin the department after completion of maternity leave:

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

Sr.No.	Name of the Student	Department	Date of Joining
1.	Ms. Pavleen Kaur	DPESS	7 th July 2017

- (v) The requests (after the last BRS meeting) duly recommended by respective DRCs, for extension of registration period of the Ph.D. students seeking first 6 months extension were considered and recommended by the Chairperson, as there was no BRS Scheduled. Further, application of students seeking extensions beyond 5½ years and 6 years were considered favorably and

recommendation sent to the Vice-Chancellor for approval. This was approved by BRS.

(2nd Extension; for 6 months after completion of 5 years and 6 months)

- | | | | |
|----|-------------------|------------|-------------------------------------------------------------|
| 1. | Ms. Shobha Kumari | Biophysics | 27 th July 2017 to 26 th October 2017 |
|----|-------------------|------------|-------------------------------------------------------------|

(3rd Extension; for 6 months after completion of 6 years)

- | | | | |
|----|--------------------------|--------------|---------------------------------------------------------|
| 1. | Mr. Naveen Sharma | P.M.B. | 29 th July 2017 to 28 th Jan 2018 |
| 2. | Mr. Nitin Jain | P.M.B. | 29 th July 2017 to 28 th Jan 2018 |
| 3. | Ms. Preeti Apurve Sharma | Genetics | 29 th July 2017 to 28 th Jan 2018 |
| 4. | Ms. Vandana | Biochemistry | 29 th July 2017 to 28 th Jan 2018 |

(vi) **Appointment of examiners**

Chairperson presented the list of students who have submitted their Ph.D. thesis since the last meeting of the BRS was held (Annexure III). He also informed the members that the list of examiners duly recommended by the respective DRCs have also been forwarded periodically to the Examination Branch for necessary action.

The meeting ended with a vote of thanks to the Chair.

(Pradeep Kumar Burma)
Chairperson