Savitribai Phule Pune University
Bioinformatics Centre

Syllabus for Ph.D. course work in Bioinformatics
(With effect from 2025-26)

(SPPU Circular 98/2025)

A total of 16 credits of PhD coursework is to be completed as follows:

Subject Code	Subject Title	Credits
RM	Research Methodology	4 credits
SCW	Attending at least One seminar/Conference/Workshop (National/International)	1 credit
SPAL	Two Subject Specific Advanced Level courses in Advanced Bioinformatics	8 credits
RPE	Research & Publication Ethics	2 credits
PIA	Pedagogical Training/Industrial Visit Report/Assessment Statement	1 credit
Total		16 credits

RM: Research Methodology   **(4 credits)**

Course Objective: Students are expected to have learnt the theory of Research Methodology as part of the Master's degree course (as per NEP-2020). The following syllabus is designed to build on that foundation with a focus on developing skills essential for successful PhD research.

Learning Outcome: Students will gain hands-on experience in applying key concepts of research methodology, including literature review, research design, data collection and analysis, as well as essential soft skills such as academic writing and presentations.

Evaluation: Students will be assessed on each module through both written and oral examinations.

Review of Published research in the relevant field   **(1 credit)**

The student is expected to write a review of literature that leads to the proposed thesis work. The review should be exhaustive and cover literature and or patents as applicable. The written review will be assessed by examiners.

Writing of Research Proposal for obtaining financial assistance from funding agencies   **(1 credit)**

The student is expected to work independently and write an original research proposal (that is different from their PhD thesis work, or any other past or present work) in the format of DBT extramural proposal to seek financial assistance. The written proposal will be evaluated by a panel of examiners for its novelty and technical feasibility. The student will also present the proposal to a committee in the form of a presentation.

Seminar Presentation   **(2 credits)**

The student is expected to

- select a high impact research paper (with approval of Guide) in the field of Bioinformatics
- reproduce at least a part of major analysis described in the paper including mathematical / statistical analysis
- highlight the merits and de-merits of the published work
- perform a presentation of the same to a panel of examiners

SCW: Attending at least One seminar/Conference/Workshop (1 credit)

Course Objective: To expose students to the latest research in Bioinformatics and fostering networking opportunities for their academic growth

Learning Outcome: Students will be able to critically analyze the research presented in seminars/conferences/workshops and apply acquired insights and professional connections to strengthen their own research.

Evaluation: To be done by the research advisory committee of student

The student is expected to attend a National/International seminar/workshop/conference (of at least 15 hours) that is of relevance to the student's PhD work. The same must be approved by the students Research Advisory Committee. The student needs to submit the certificate of participation/oral/poster presentations etc. It is desirable that the student presents his/her research work in the seminar/workshop/conference.

SPAL: Subject Specific Advanced Level Courses (8 credits)

Course Objectives: Each course is designed to provide comprehensive content of emerging areas in Bioinformatics in a self-learning assignment mode, complementing the theoretical classes. Students may select modules aligned with their research interests

Learning Outcome: Students will gain an in-depth understanding of diverse areas in Bioinformatics, including recent advances in the field, while also developing practical skills through hands-on assignments.

Evaluation: Continuous assessment would be carried out through internal tests, practical assignments including final theory as well as practical exam.

Students are expected to select any 2 courses from any two of the following modules:

SPAL1 Advances in Bioinformatics- I
Advanced Genomics & Metagenomics
Transcriptomics
Proteomics
Metabolomics

SPAL2 Advances in Bioinformatics- II
Disease Biology
Multi-Scale Modeling
Computer Aided Drug Design
Macromolecular Structure and Function

SPAL3 Advances in Bioinformatics- III
Programming in Python
Applications of Programming in R
Data Analytics using AI/ML
Development of workflows for Data Processing
Bioinformatics resource development

SPAL4 Advances in Bioinformatics- IV
Computational Molecular Phylogeny
Computational Immunology
Bioinformatics in Translational Research
Metabolic Pathway Engineering
Systems Biology

SPAL5 Optionally students may also choose elective course from other Department/ online courses offered by UGC/National Agency/MOOCS/SWAYAM/NPTEL etc. of 4 credits with approval of the student's Research Advisory Committee.

RPE: Research & Publication Ethics   **(2 credits)**

Bioinformatics Centre shall conduct the UGC approved 02 credits course as per UGC letter No. D.O.F. 1-1/2018 (Journal/CARE) Dated Dec.2019 and SPPU circular No. 65/2020 dated 3rd march 2020 **Optionally** student can complete the Research and Publication ethics course run by the Centre of Publication Ethics SPPU.

Course Objectives: This course aims to familiarize students with responsible research practices, authorship, plagiarism, related to presenting and publishing research work

Learning Outcomes: Students will develop practical skills to ensure ethical decision-making in conducting, writing, and publishing research.

Evaluation: Continuous assessment would be carried out through internal tests, practical assignments including a final exam.

Modules	Unit Title	Teaching Hours
Theory		
1	Philosophy and Ethics	4
2	Scientific Conduct	4
3	Publication Ethics	7
Practice		
4	Open Access Publishing	4
5	Publication Misconduct	4
6	Database and Research Metrics	7

PIA: Pedagogical Training/Industrial Visit/ Assessment Statement   **(1 credit)**

Course objective: To foster the professional development of students by integrating teaching ability or industry awareness necessary for academic or research careers. Students can choose either Pedagogical Training or Industrial Visit.

Learning Outcome: Students will be able to demonstrate enhanced professional competencies strengthening their preparedness for academic or industry careers.

Evaluation: For Pedagogical Training, evaluation will be based on the students that were taught as well as guide's feedback. For Industry visit the supervisor at Industry will perform evaluation.

The students are expected to conduct theory and practical sessions under the guidance of a faculty member (equivalent to a minimum of 15 theory hours or 30 practical hours or a combination of the two). Alternately the students work in the Industry for a minimum of 30 hours.

Important Information:
1. Course of 1 credit implies 15 hours of teaching/learning/hands on sessions/tutorials etc.
2. Attendance in each course is compulsory (minimum 75%).
3. Examination will be as per SPPU credit course examination pattern (50% internal assessment and 50% external), subject to revision as per University rules and guidelines.
4. In each course, the student needs to score a minimum of 55% marks to pass.
5. Internal and External examination could be of any of the following types and it is under the discretion of the Course Coordinator: a) Written test (MCQ/Short question type), b) Oral test, c) assignment, d) seminar etc.