

## SCHOOL OF COMPUTATIONAL AND INTEGRATIVE SCIENCES

The **School of Computational and Integrative Sciences** (formerly the School of Information Technology), Jawaharlal Nehru University, presently houses the **Center for Computational Biology and Bioinformatics**, a Center of Excellence of the Department of Biotechnology, Govt. of India. Additionally SCIS has initiated the **Center for Complex Systems**, introduced and supported in the XII Plan by the UGC. The major objective of SCIS is the integration of skills from different disciplines with application to problems in the natural and social sciences. This mission is reflected in the diverse faculty profile of the school which comprises researchers from fields as varied as Computational Biology, Complex Systems, Statistical Data Analysis and Modeling, Computer Science, and Theoretical and Computational Chemistry, Petri nets and Graph Theory, Mathematical Biology, Computational RF and Microwave, Antenna for Biomedical application.

Teaching and research programs in **Computational and Systems Biology** involve the research, development, and application of computational tools and approaches for expanding the use of biological, medical, behavioral or health data, including those to acquire, store, organize, archive, analyze, or visualize such data. In addition, research programs involve the development and application of data-analytical and theoretical methods, mathematical modeling and computational simulation techniques to the study of biological, behavioral, and social systems. The School has initiated a program in **Complex Systems** which will study the behavior of mathematical, physical, living and social systems, identify patterns that underlie these inter-related systems, and examine properties such as emergence, evolution, network, structure and dynamics of these systems in a competitive environment.

SCIS is offering **M.Sc. degree in Computational and Integrative Sciences** with a specialization in either Computational Biology or Complex Systems. The Computational Biology stream will have equivalence to the M.Sc. in Bioinformatics, while the Complex Systems stream will have equivalence to the M.Sc. in Physical Sciences. The School is also introducing a program in data science through a **Post-Graduate Diploma in Big Data Analytics (PGBD)**, with specialization in Biological Big Data. The program is aimed at training post graduates in the upcoming field of Big Data analytics for life sciences and health. Trained graduates from this program are expected to learn key technologies of data sciences, including big data collection and warehousing as well as machine learning, data integration and modeling technologies which can be applied in an academic and industry environment in the future. The School has encouraged intake from multiple disciplines into these programs – Information Technology, Engineering Sciences, Bioinformatics, the Life Sciences/Biotechnology, the Physical, Chemical Sciences and Mathematical Sciences, among others.

The teaching and research programs are supported by good computational and communication infrastructure. Each student is provided with a personal workstation, and the School manages a centralised facility for high-performance computers, consisting of computer clusters with multiprocessor nodes, large-memory nodes and GPUs to facilitate specialized research.

### PROGRAMMES OF STUDY

School of Computational and Integrative Sciences offers the following three academic programmes for the current year:

(i) **Admission to Ph.D. program in Computational Biology and Bioinformatics, Complex Systems**

Suitable courses may be prescribed for candidates admitted to the Ph.D.

(ii) **M.Sc. programme in Computational and Integrative Sciences**

With a specialisation either in Computational biology or Complex Systems

The course work leading to the award of a M.Sc. in Computational and Integrative Sciences shall be for a period of four semesters (two monsoon and two winter semesters) with a compulsory requirement for submission of a research-based dissertation at the end of the fourth semester. A student will need to earn a minimum of 72 credits, including 9 credits for the dissertation.

(iii) **Post-Graduate Diploma in Big Data Analytics**

(With a specialization in Biological Big Data)

1. The curricular work leading to the award of Post-Graduate Diploma shall be spread over a period of 2 semesters - one Monsoon Semester and one Winter Semester with a provision of a project report to be submitted by student latest by July 21 at the end of the Winter Semester.
2. A student shall have to earn a minimum of 21 credits including 6 credits for project at the end of one year in order to be eligible for the award of Post-Graduate Diploma.

**M.Sc. Programme**

| Sl. No. | Name of Centre   | Sub. Code & Sub. Code Number                      | Intake | Eligibility   | Viva/ Non Viva | Course outline/guidelines  | Paper will be subjective/objective/ both |
|---------|--|---|--------|---|----------------|--|--|
| 1       | School of Computational and Integrative Sciences (SC&IS) | Computational and Integrative Sciences-CISM (232) | 18     | A minimum of 55% marks in Bachelor's degree in any branch of Basic and Applied Science or Technology, including medicine and engineering disciplines. Candidates would be selected through an entrance examination followed by an interview of short-listed candidates. | Viva - Voce    | <p><b>Integrated M.Sc-Ph.D programme in Computational and Integrative Sciences</b></p> <p>All questions will be of multiple choice types. The question paper will be divided into two parts. For PART-A, each correct answer will fetch 1 marks and for each wrong answer there will be a deduction of 0.25 marks. For PART-B, each correct answer will fetch 2 marks and for each wrong answer there will be a deduction of 0.5 marks.</p> <p><b>PART-A:</b> Will have 20 (twenty) questions to test the candidate's aptitude in Mathematics. Questions will be only of Mathematics/Statistics at the 10+2 level. Only those candidates who score above 50% in Part A will be eligible for admission.</p> <p><b>PART-B:</b> There will be 25 (twenty five) subject specific questions in each of the four subject categories, i.e. i) Mathematics ii) Physics iii) Chemistry and iv) Biology. Candidates are required to attempt any ONE category only. Questions will be of B.Sc. level.</p> | Objective                                |

**Post-Graduate Diploma in Big Data Analytics (PGDE)**

| Sl. No. | Name of Centre   | Sub. Code & Sub. Code Number                             | Eligibility   | Additional information   | Viva/ Non Viva | Course outline/guidelines  | Paper will be subjective/objective/ both |
|---------|--|--|---|--|----------------|--|--|
| 1       | School of Computational and Integrative Sciences (SC&IS) | Post-Graduate Diploma in Big Data Analytics – PGDE (184) | M.Sc/B.Tech in Physics/ Chemistry/ Mathematics/Computer Science/ Statistics/ Operations research/Bioinformatics/related disciplines in physical sciences and engineering. Minimum of 55% in the qualifying degree | P.G. holders of AYUSH related subjects are also eligible to apply. | Viva - Voce    | <p>All questions would be of the multiple choice type. The question paper will be divided into two parts. For Part A, each correct answer will fetch 1 marks and for each wrong answer there will be a deduction of 0.25 marks. For Part B, each correct answer will fetch 2 marks and for each wrong answer there will be a deduction of 0.5 marks.</p> <p><b>PART A</b> (Data Science Aptitude): This will have 30 questions to test the candidate's knowledge of basic concepts required to learn data science. This will essentially test mathematical and statistical ability at the 10 +2 level. This section may also contain questions on general reasoning/analytical ability.</p> <p><b>PART B</b> (subject knowledge): There will be 20 subject specific question in each of the following five categories i.e. a) Chemistry; b) Physics; c) Maths/Statistics; d) Bioinformatics; and e) Computer Science and Engineering. The applicant can answer from any one category (i.e 20 questions) listed above. Questions will be of B.Sc/M.Sc level.</p> <p><b>The entrance exam question paper would be prepared as per UGC Regulations 2016</b></p> | For details please check JNU website     |

**Ph.D.**

| Sl. No. | Name of Centre   | Sub. Code & Sub. Code Number                        | Eligibility   | Additional information                      | Viva/N on Viva     | Course outline/guidelines   | Paper will be subjective/objective/both     |
|---------|--|---|---|---|--------------------|---|---|
| 1       | School of Computational and Integrative Sciences (SC&IS) | Computational Biology and Bioinformatics-CBBH (903) | <p>Admission to Ph.D. Program in Computational Biology and Bioinformatics, Complex Systems is available.</p> <p>Only those candidates in science/Engineering branch shall be considered for admission to the Ph.D. program who have :</p> <p>(a) Obtained 2 years M.Phil./M.Tech. degree in the related field like science, engineering, medical and pharmaceutical science from a recognized University/Institution (with dissertation/seminar/Viva) or one year M.Phil. in the related field like science, engineering, medical and pharmaceutical science with additional one year research experience of a recognized University/Institution, and one publication.</p> <p style="text-align: center;">OR</p> <p>(b) at least two years research experience after Master's degree/BE/B.Tech. in reputed institutions in the related fields with research publication(s) comparable to M.Phil. standard. In addition, they should have obtained Master's Degree/BE/B.Tech. in the related fields with 55% marks or equivalent FGPA in 10 point scale/comparable standard where the grading is based on system other than 10 point scale.</p> <p style="text-align: center;">OR</p> <p>(c) Candidates with Advanced Diploma (after M.Sc. degree) in Bioinformatics are also eligible.</p> <p>(d) However, the School reserves the right to adopt additional criteria for shortlisting of the applications.</p> | <b>For details please check JNU website</b> | <b>Viva - Voce</b> | <b>The entrance exam question paper would be prepared as per UGC Regulations 2016</b><br><br><b>For detail please check JNU website</b> | <b>For details please check JNU website</b> |