



SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

School of Bio and Chemical Engineering Department of Bioinformatics

1.3.2 Value Added Courses for Imparting Transferable and Life Skills Offered During 2022 – 2023

S. No.	Title	Event Dates	Page No.
1	Next Generation Sequencing (NGS) Data Analytics	11.07.2022 to 29.07.2022	3
2	Computational Chemistry	07.09.2022 to 30.09.2022	8
3	Introduction to Mathematics for Computational Biology	15.11.2022 to 30.11.2022	14

1 NGS Data Analytics – Workshop
(July 11 - July 29th 2022)



SATHYABAMA

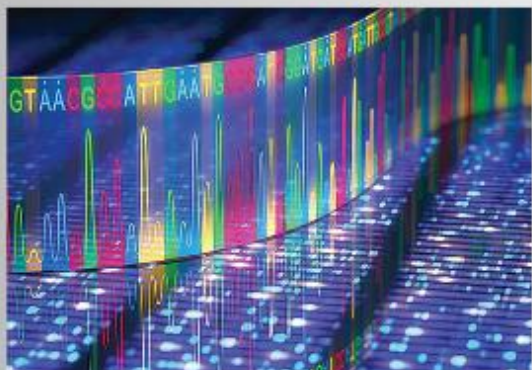
INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University)
www.sathyabama.ac.in



**Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology**

Presents

NGS DATA ANALYTICS WORKSHOP - 2022



July 11 - July 29th 2022

FACULTY CO-ORDINATOR - DR. SWETHA SUNKAR.



COL. Dr. JEPPIAAR
Founder Chancellor



Dr. Mariazeena Johnson
Chancellor



Dr. Marie Johnson
President



Mr. J. Arul Selvan
Vice President



**Ms. Maria Bernadette
Tamilarasi Johnson**
Vice President



**Ms. Maria Catherine
Jayapriya**
Vice President

PATRONS
Dr. T. SASIPRABA, M.E., Ph.D. VICE-CHANCELLOR, SIST
Dr. S. S. RAO, M.B.A., Ph.D. REGISTRAR, SIST | Dr. E. LOGASHANMUGAM, M.E., Ph.D., PRO VICE CHANCELLOR, SIST

Organizing Members - Dr. Jemmy Christy | Dr. Swetha Sunkar | Dr. D. Alex Anand,
Department of Bioinformatics, SIST

Facilitated by - The Students & Faculty, Department of Bioinformatics & CMDSSCB

List of Participants

S.NO	REGISTER NO	NAME
1.	40738001	ANGARA SREE THRIVENI SAMHITHA
2.	40738002	ARUN. P
3.	40738003	ASWINI. T
4.	40738004	DIKSHA .S
5.	40738005	GUDA DEEPAK REDDY
6.	40738006	HAMSA PRIYAA. M
7.	40738007	ISWARYA. S.V
8.	40738008	KAMESHWARAN. T
9.	40738009	KESAVAPRIYA. R
10.	40738010	LIZI BERCIYA.J
11.	40738011	MARY PORTIA.J
12.	40738012	MEENAKSHI.D
13.	40738013	NILOFAR.A
14.	40738014	RANJITH.B.K
15.	40738015	RITHIK RISHI.C.S
16.	40738016	SAMHITHA.S
17.	40738017	SANTHOSH.S
18.	40738018	SHYLA NANCY. J
19.	40738019	SNEKHA.B
20.	40738020	SRINIDHIN.S
21.	40738021	SUMESH.S
22.	40738022	SUSHMA.T.A
23.	40738023	SUTHARSANAN.S

NGS Data Analytics – Workshop
(July 11 - July 29th 2022)

Days	Date	Topics Covered	Faculty-In-Charge
1-2	11-7-2023 to 12-7-2023	Introduction to Unix/Linux & running workflows	Dr. Alex Anand
3-4	13-7-2023 to 14-7-2023	Introduction to NGS Technologies	Dr. Swetha Sunkar
5-6	15-7-2023 to 18-7-2023	NGS data pre-processing and QC	Dr. Jemmy Christy
7-8	19-7-2023 to 21-7-2023	Alignment to reference sequences	Dr. Jemmy Christy
9-10	22-7-2023 to 25-7-2023	Variant calling and annotation	Dr. Alex Anand
11-12	26-7-2023	ChIPSeq	Dr. Swetha Sunkar
13-14	27-7-2023	RNASeq	Dr. Jemmy Christy
15-16	28-7-2023 to 29-7-2023	Genome assembly	Dr. Alex Anand

Next Generation Sequencing Workshop – Objective and outcomes

- Next-generation sequencing (NGS) technologies are now a crucial component of practically all life sciences research and diagnostics.
- NGS data are often processed by qualified bioinformaticians because to their volume and, more importantly, complexity.
- This is also a serious issue for experienced professionals in life sciences who have never studied NGS because it is too new and must suddenly adapt to completely new tools, workflows, and scientific terminology, not to analyse NGS data themselves (after all, that is why we have bioinformaticians), but to ask the right questions and understand the results.
- Our session will teach you the fundamentals of NGS data processing.
- Its purpose is to teach students how to perform the fundamental processes of NGS data analysis, such as raw data manipulation, quality control, and the elimination of low-quality sequences, sequence adapters, artefacts, or other contamination. The end result should be complete mastery of the process, with the output being a set of high-quality data that can be used for further analysis.
- You will become acquainted with numerous NGS data formats, learn about the specific benefits and drawbacks of sequencing technologies and how to cope with them, and gain an understanding of the history of individual techniques used to change NGS data. You will not become a bioinformaticist after this three-day training, but you will be well on your way to being **a qualified partner for bioinformaticists on your team.**



SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology

Next Generation Sequencing Workshop - 2022

CERTIFICATE OF PARTICIPATION

THIS IS TO CERTIFY THAT

HAMSA PRIYAA. M

has participated in the Hands on Training workshop on "Next Generation Sequencing" that was held from the 11th July - 29th July, 2022..

DR. V. RAMESH KUMAR
CONVENER

DR. JEMMY CHRISTY
HEAD, DEPARTMENT OF BIOINFORMATICS

DR. T. SASIPRABA
VICE CHANCELLOR

2. Computational chemistry



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University)
www.sathyabama.ac.in



Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology

Presents

COMPUTATIONAL CHEMISTRY - A WORKSHOP



 Sep 7– Sep 30, 2022

FACULTY CO - ORDINATOR - DR JEMMY CHRISTY



COL Dr. JEPPIAAR
Founder Chancellor



Dr. Mariazeena Johnson
Chancellor



Dr. Marie Johnson
President



Mr. J. Arul Selvan
Vice President



Ms. Maria Bernadette
Tamilarasi Johnson
Vice President



Ms. Maria Catherine
Jayapriya
Vice President

PATRONS
Dr. T. SASIPRABA, M.E., PH.D VICE - CHANCELLOR, SIST
Dr. S. S. RAO, M.B.A., PH.D REGISTRAR, SIST | Dr. E. LOGANATHANMUGAM, M.E., PH.D., PRO VICE CHANCELLOR, SIST

Organizing Members - Dr. Jemmy Christy | Dr. Swetha Sunkar | Dr. D. Alex Anand,
Department of Bioinformatics, SIST

Facilitated by - The Students & Faculty, Department of Bioinformatics & CMDSSB

List of Participants
Sep 7 – Sep 30, 2022

S. No.	REG. NO.	NAME
1.	40738001	Angara Sree Thriveni Samhitha
2.	40738002	Arun. P
3.	40738003	Aswini. T
4.	40738004	Diksha .S
5.	40738005	Guda Deepak Reddy
6.	40738006	Hamsa Priyaa. M
7.	40738007	Iswarya. S.V
8.	40738008	Kameshwaran. T
9.	40738009	Kesavapriya. R
10.	40738010	Lizi Berciya.J
11.	40738011	Mary Portia.J
12.	40738012	Meenakshi.D
13.	40738013	Nilofar.A
14.	40738014	Ranjith.B.K
15.	40738015	Rithik Rishi.C.S
16.	40738016	Samhitha.S
17.	40738017	Santhosh.S
18.	40738018	Shyla Nancy. J
19.	40738019	Snekha.B
20.	40738020	Srinidhin.S
21.	40738021	Sumesh.S
22.	40738022	Sushma.T.A
23.	40738023	Sutharsanan.S

Computational chemistry – Workshop
Sep 7 – Sep 30, 2022

Day	Date	Topics Covered	Faculty-In-Charge
1	07-09-2022	Chemistry databases - Introduction	Dr. Alex Anand
2	08/09/22	Chemistry databases -Hand on	Dr. Alex Anand
3	09/09/22	Chemistry databases –Hands on	Dr. Alex Anand
4	11/09/22	Chemsketch – theory and Hands on	Dr. Alex Anand
5	12/09/22	Chemsketch - Hand on	Dr. Alex Anand
6	13/09/22	Molview and Rasmol	Dr. Swetha Sunkar
7	14/09/22	Pymol	Dr. Swetha Sunkar
8	15/09/22	Open Babel – Hands on	Dr. Swetha Sunkar
9	16/09/22	Mcule –hands on	Dr. Swetha Sunkar
10	18/09/22	SWISSADME	Dr. Swetha Sunkar
11	19/09/22	Toxicity prediction - theory	Dr. Alex Anand
12	20/09/22	Toxicity prediction – hands on	Dr. Alex Anand
13	21/09/22	SWISSMODEL	Dr. Swetha Sunkar
14	22/09/22	Model Validation	Dr. Swetha Sunkar
15	23/09/22	Energy Minimization	Dr. Swetha Sunkar
16	25/09/22	Discovery studio - 1	Dr. Alex Anand
17	26/09/22	Discovery studio - 2	Dr. Alex Anand
18	27/09/22	Gromacs – 1	Dr. Alex Anand
19	28/09/22	Gromacs – 2	Dr. Alex Anand
20	29/09/22	Gromacs – 3	Dr. Alex Anand
21	30/09/22	Gromacs – 4	Dr. Alex Anand

Computational Chemistry – Objectives and outcomes

The phrase theoretical chemistry can be described as a mathematical representation of chemistry, whereas computational chemistry is typically used when a mathematical approach has been sufficiently developed to be automated for computer execution. Chemists, physicists, and mathematicians work together to create algorithms and computer systems that anticipate atomic and molecular characteristics and reaction routes for chemical reactions. In contrast, computational chemists may simply apply existing computer tools and approaches to specific chemical problems.

Computational chemistry is divided into two parts:

- Computational investigations, which are used to determine a starting point for a laboratory synthesis or to help comprehend experimental data, such as the position and source of spectroscopic peaks.
- Computational studies, which are used to forecast the potential of previously unknown compounds or to investigate reaction mechanisms that are not easily examined through experiments.

Thus, computational chemistry can either assist or challenge experimental chemists to discover whole new chemical objects.

Within computational chemistry, many important fields can be distinguished:

- The prediction of a molecule's molecular structure using force simulation or more accurate quantum chemistry methods to discover stationary points on the energy surface as the position of the nucleus is altered.
- storing and searching for chemical entity data (see chemical databases).

- Recognizing relationships between chemical structures and properties (see quantitative structure-property relationship (QSPR) and quantitative structure-activity relationship (QSAR)).
- Computational techniques to aid in chemical synthesis efficiency.
- Computational approaches to designing compounds that interact with other molecules in certain ways (e.g. drug design and catalysis).



SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology

Computational Chemistry - A workshop

CERTIFICATE OF PARTICIPATION

THIS IS TO CERTIFY THAT

ANGARA SREE THRIVENI SAMHITHA

has participated in the Hands on Training on "Computational Chemistry - A workshop" that was held from the Sep 7 - Sep 30, 2022 .

DR. V. RAMESH KUMAR
CONVENER

DR. JEMMY CHRISTY
HEAD, DEPARTMENT OF BIOINFORMATICS

DR. T. SASIPRABA
VICE CHANCELLOR

3. Introduction to Mathematics for Computational Biology (Nov 15 – Nov 30)



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University)
www.sathyabama.ac.in



**Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology**

Presents

INTRODUCTION TO MATHEMATICS FOR COMPUTATIONAL BIOLOGY - 2022



 **November 15 – November 30, 2022**

FACULTY CO - ORDINATOR - DR KIRUBASHANKAR



COL. Dr. JEPPIAAR
Founder Chancellor



Dr. Mariazeena Johnson
Chancellor



Dr. Marie Johnson
President

PATRONS
Dr. T. SASIPRABA, M.E., Ph.D. VICE - CHANCELLOR, SIST
Dr. S. S. RAD, M.B.A., Ph.D. REGISTRAR, SIST | Dr. E. LOGANATHANMUGAM, M.E., Ph.D., PRO VICE CHANCELLOR, SIST

Organizing Members - Dr. Jemmy Christy | Dr. Swetha Sunkar | Dr. D. Alex Anand,
Department of Bioinformatics, SIST

Facilitated by - The Students & Faculty, Department of Bioinformatics & CMDSSB

Course coordinator - Dr. Kirubashankar

List of Participants

S. No	Register Number	Name of the student
1	40050016	Harini
2	40050014	Gokul Nathan
3	40050060	R.Yuvan Selvan
4	40050059	Yamuna. R
5	40230008	S.Dharshini
6	40050032	Nithya Sree B
7	39050026	S.Kokila
8	40770047	U.L. Shakthi Mythili
9	40770023	Kiran Sumesh
10	40738013	Nilofar
11	40770029	Meenakshi S
12	40738003	Aswini T
13	40738008	Kameshwaran T
14	39240031	Renita D
15	39050042	S.Ruppana
16	40738022	Sushma T A
17	40050703	Solomon
18	40030043	S. Yogalakshmi
19	40050005	Anisha Bashir
20	40050054	Vasanth
21	40050051	B.Sugapriya
22	40050051	B.Sugapriya
23	40230032	Nitish Kumar. S
24	40230034	Praveen.S
25	40230055	Rizwan Ahamed N
26	40738011	Mary Portia
27	40738004	S . Diksha
28	40050703	G.Kannan
29	40738017	Santhosh.S
30	40738023	Sutharsanan
31	40738021	Sumesh S
32	40738010	Lizi Berciya J
33	40738002	Arun P
34	40738006	Hamsa Priyaa.M
35	40738012	D.Meenakshi
36	40738019	Snekha B
37	40230021	Kaviya Priya K
38	40230022	Mahalakshmi R
39	40738005	Guda Deepak Reddy

40	39050002	Abishek P
41	39050033	B. Nithya Dharani
42	39050012	Deepan Balaji M
43	40738018	Shyla Nancy. J
44	40738020	Srinidhin S
45	39050017	Indra. K
46	40738015	Rithik Rishi
47	39050018	G.Jayapriya
48	41739010	K.Milind
49	39050046	Sandhoshini. D
50	39050010	T Chithirai Selvi
51	39050035	Nivetha S
52	40050012	Dilli Babu
53	40050060	R.Yuvan Selvan
54	40050026	Kaviyarasan.K

Day wise schedule

Date	Topic
Nov 15, 2022	Early history and recent Growth
Nov 16, 2022	Abstract relational biology
Nov 17, 2022	Algebraic biology
Nov 18, 2022	Complex systems biology
Nov 20, 2022	Computer models and automata theory
Nov 21, 2022	Modeling cell and molecular biology
Nov 22, 2022	Modelling physiological systems
Nov 23, 2022	Computational neuroscience
Nov 24, 2022	Evolutionary biology
Nov 25, 2022	Mathematical biophysics
Nov 27, 2022	Mathematical methods
Nov 28, 2022	Model example: the cell cycle
Nov 29, 2022	Mathematical and theoretical Biology
Nov 30, 2022	Research groups and Thrust areas in India and abroad

**Lecture / Hands on Workshop on Introduction to
Mathematics for Computational Biology - Objective and outcomes**

- Students should have knowledge of and an understanding of a variety of advanced mathematical techniques and how they apply to biological systems by the end of the course. They should also understand the basic ideas underlying some mathematical techniques that can be used to comprehend biological systems.
- Quantitative approaches are widely considered to be helpful in addressing biological concerns at both the macro (population, community, ecosystem) and tiny (chemical and chromosomal) scales. It may be argued that these attempts have resulted in intriguing mathematical, statistical, and quantitative developments. However, the biological and mathematical communities have not fully benefited from one another at dimensions greater than DNA but smaller than populations.
- This failure is particularly striking from a systems or integrative biology perspective. The main focus of systems biology is on how biological elements interact to produce adaptive behaviour at a higher level of integration. We use a broad definition of systems biology to include topics like the dynamics of intracellular genetic and protein networks during development, the incorporation of tissue responses to create dynamic homeostasis at the organism level, the emergence of higher cognitive function from neural networks, and the organisation of social systems by the movement and interaction of individual organisms. It is obvious that improvements in mathematical, statistical, computational, and engineering analysis can help with such challenges.
- A number of scientific advances in fields like genomics, bioinformatics, and environmental biology that have largely embraced quantitative methodology have led to complementary motivations for improving the mathematical and computational aspects of systems biology. It therefore seems natural to look into what opportunities are similar in systems biology and what critical issues need to be resolved to achieve these opportunities. If systems biology does not adopt these analytical techniques, funding opportunities will be reduced due to the increased successful emphasis on mathematical and computational approaches in rival areas like medicine, genomics, and proteomics. If we don't take advantage of developments in the computational and mathematical sciences, we can also miss a chance to gain a greater knowledge of integrated living systems.



SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Bioinformatics &
The Centre for Molecular Data Science and Systems Biology

**HANDS ON WORKSHOP ON
INTRODUCTION TO MATHEMATICS FOR COMPUTATIONAL BIOLOGY**

CERTIFICATE OF PARTICIPATION

THIS IS TO CERTIFY THAT

LIZI BERCIYA J

has participated in the Hands on Training on "Introduction to Mathematics for Computational Biology" that was held from the November 15 to November 30, 2022

Course coordinator - Dr. Kirubashankar

DR. V. RAMESH KUMAR
CONVENER

DR. JEMMY CHRISTY
HEAD, DEPARTMENT OF BIOINFORMATICS

DR. T. SASIPRABA
VICE CHANCELLOR