

**HONOURS CERTIFICATE PROGRAMME PROPOSAL
AY 2022-2023**

Department of Microbiology, St. Xavier's College

We are offering two courses for the year 2022-23:

1. Online lecture series on 'Introduction to Biostatistics'
2. Workshop on 'Basics of animal tissue culture'
3. Python programming: algorithms and applications in bioinformatics

Activity-1

General Information of the Activity	
1.	Department and Hub Dept: Microbiology Hub: Biological science
2.	Title of the Activity Online lecture series on 'Introduction to Biostatistics'
3.	Name of the Professor taking the course and Email address Dr. Aparna Talekar aparna.talekar@xaviers.edu
4.	Name/s of the Resource person/s Ms. Snigdha Pain
5.	Name of the Dept Coordinator and Email address Dr. Pampi Chakraborty pampi.chakraborty@xaviers.edu
6.	Name of the Hub Coordinator and Email address Dr. Priya S priya.s@xaviers.edu
7.	Number of credits for the activity and number of hours Credits: 01 Hours: 15
8.	Fees 1000
9.	Eligibility SYBSc and TYBSc students with Biology background
10.	Number of students Minimum quorum required: 15
11.	Duration and Time 6-7 weeks with 2 hours per week in the even semester (November-January)

Details of the Activity	
1	Title: Online lecture series on ‘Introduction to Biostatistics’
2	<p>Learning Objectives: To make students competent to,</p> <ol style="list-style-type: none"> 1. Use the right measure of central tendency and dispersion for given dataset depending upon the scale 2. Identify if the dataset follows normal distribution and solve problems based on normal distribution. 3. Apply hypothesis testing to experimental data and understand the concepts of errors, confidence intervals with respect to the following statistical tests; z test, t test, chi square test, ANOVA 4. Perform correlation and regression analysis 5. Use Excel/other easy to use software to perform statistical analysis and formulate a conclusion from the output. <p>--</p>
3	<p>Learning Outcomes:</p> <p>After completing the course students will be able to</p> <ul style="list-style-type: none"> ● Describe data obtained from biology experiments in quantitative terms ● Identify and perform the right statistical test for given dataset depending on the objective of the study (restricted to z, t , chi square test and ANOVA) ● Use statistics to detect linear correlation between two variables and also apply simple linear regression analysis to compute unknown parameters
4	<p>Description</p> <p>The course aims to equip undergraduate biology students with statistical tools to analyze data obtained in the biological experiments. This is a single credit course (15hrs) that covers descriptive statistics and commonly used statistical tests.</p>
5	Modules if any: NA

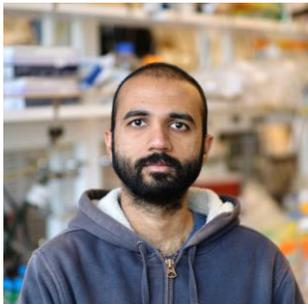
Activity-2

General Information of the Activity	
1.	Department and Hub Dept: Microbiology Hub: Biological sciences
2.	Title of the Activity Lecture series on 'Basics of animal tissue culture'
3.	Name of the Professor taking the course and Email address Dr. Pampi Chakraborty pampi.chakraborty@xaviers.edu
4.	Name/s of the Resource person/s Dr. Pampi Chakraborty
5.	Name of the Dept Coordinator and Email address Dr. Pampi Chakraborty pampi.chakraborty@xaviers.edu
6.	Name of the Hub Coordinator and Email address Dr. Priya Sundarrajan priya.s@xaviers.edu
7.	Number of credits for the activity and number of hours Credits: 02 Hours: 30 hours
8.	Fees Rs. 5000/-
9.	Eligibility SY / TY B.Sc. students Recommended previous knowledge: Basic knowledge in cell biology, biochemistry and aseptic techniques.
10.	Number of students Minimum quorum required: 10 Maximum quorum permitted: 20
11.	Duration and Time 6-7 days with 6 hours per day in the even semester (December, 2021-January, 2022)

Details of the Activity	
1	Title: Workshop on ‘Basics of animal tissue culture’
2	<p>Learning Objectives: To make students competent to,</p> <ul style="list-style-type: none"> ● Understand the design and layout of the cell culture laboratory ● Perform the methods for measuring cell viability, sub-culturing, cryopreservation and revival. ● Understand the principle of the assays for cell sorting, proliferation and cell death. ● Analyze the data for cytotoxicity assay (MTT)
3	<p>Learning Outcomes:</p> <p>After completing the course, students will be able to</p> <ul style="list-style-type: none"> ● Understand the design and use the cell culture facilities ● describe the basic techniques required for cell culture, the methods for adherent and non-adherent cell line maintenance and cell cultures constraints ● Apply the principles of cell death and cell proliferation assays
4	<p>Description</p> <p>Animal tissue culture plays a significant role in the field of Biotechnology. It is one of the major tools in basic research as well as in modern medicine. This course is designed for SY and TY students to develop an understanding of the practical aspects of animal tissue culture.</p>
5	Modules if any: NA

Activity 3

General Information of the Activity	
1.	Department and Hub Dept: Microbiology Hub: Biological science
2.	Title of the Activity Python programming: fundamentals and applications in bioinformatics
3.	Name of the Professor taking the course and Email address Dr. Deepesh Nagarajan 1337deepesh@gmail.com
4.	Name/s of the Resource person/s Dr. Deepesh Nagarajan
5.	Name of the Dept Coordinator and Email address Dr. Pampi Chakraborty pampi.chakraborty@xaviers.edu
6.	Name of the Hub Coordinator and Email address Dr. Priya S priya.s@xaviers.edu
7.	Number of credits for the activity and number of hours Credits: 02 Hours: 36
8.	Fees 5000 Rs. 4000 in fees will be refunded if the student drops out before 4 lectures / 2 weeks.
9.	Eligibility All students
10.	Number of students Minimum quorum required: 5 Maximum quorum permitted: 15
11.	Duration and Time 9 weeks with 4 hours per week in the odd semester (June-December)

Details of the Activity	
1	Title: Python programming: fundamentals and applications in bioinformatics
2	<p>Learning Objectives:</p> <p>Understand elementary python syntax and the basics of programming</p> <ol style="list-style-type: none"> 1. Learn about variables, data types if/else statements 2. Loops (for/while), data input, functions 3. Inbuilt python data types: lists, dictionaries 4. Elementary algorithms: prime numbers and Eratosthenes' sieve, recursive factorial calculation, binary search. 5. Understanding algorithmic complexity and big-O notation <p>Learn how to use python to solve bioinformatic and structural biology problems.</p> <ol style="list-style-type: none"> 1. Fasta format and sequence input into python 2. Convert DNA to protein sequences (and vice versa) 3. Elementary string manipulation problems: find complementary sequences, find a pattern in a sequence, find matching substrings. 4. Understanding and processing the PDB file format. 5. Elementary protein design: dihedral angle manipulation, generating Ramachandran plots, alpha helix backbone design.
3	<p>Learning Outcomes:</p> <p>After completing the course students will be able to</p> <ul style="list-style-type: none"> • Program in python: Read and manipulate data into python, use Python to solve simple problems. • Learn how to input and manipulate biological sequence and structural data. • Learn how to approach research-level bioinformatic problems.
4	<p>Description</p> <p>This course will help a student understand elementary python syntax and the basics of programming. Once that is accomplished, a student will learn how to use python to solve bioinformatic and structural biology problems.</p>
<p>About the instructor:</p> <div style="display: flex; align-items: flex-start;">  <div> <p>Dr. Deepesh Nagarajan completed his PhD at the Indian Institute of Science, Bangalore in the field of protein design. He completed a post-doctoral fellowship at the University of Washington under Prof. David Baker, who is the leading protein designer in the field.</p> <p>Dr. Nagarajan has 10 years of experience computationally designing proteins and peptides. He is one of the very few protein designers in the country, and he is eager to share his knowledge with you.</p> </div> </div>	

Python Programming: Fundamentals and applications in bioinformatics



What you will learn:

How to input and process data in Python, while working in a Linux environment

How to use Python as a tool to solve elementary problems in any field

How to approach and solve research-level bioinformatic problems using Python

Course credits: 2

Course Hours: 36

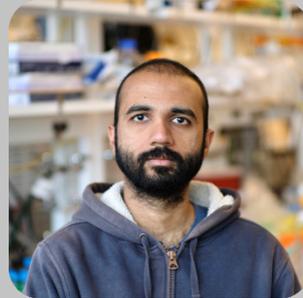
Jul-Sep, 2 classes per week

Course fees: ₹5000

Partial refund (₹4000) available to students who quit before 4 lectures

Mail: micro.dept@xaviers.edu
to join

About your instructor:



Dr. Deepesh Nagarajan

(Assistant Professor, Department of Microbiology)

completed his PhD at the Indian Institute of Science, Bangalore in the field of protein design. He completed a post-doctoral fellowship at the University of Washington under Prof. David Baker, who is the leading protein designer in the field.

Dr. Nagarajan has 10 years of experience computationally designing proteins and peptides. He is one of the very few protein designers in the country, and he is eager to share his knowledge with you.

Course open to everyone



Department of Microbiology

St. Xavier's College (Mumbai)