

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Syllabus for PG Diploma in Bioinformatics, Semester - 1

Subject Name: Python for Bioinformatics

Subject Code: 1310203

W.E.F 2021-22

### 1. Learning Outcomes

Learning Component	Outcome	Learning Outcome (Learner will be able to)
Programming Environment and Domain Knowledge		<ul style="list-style-type: none"><li>Understands the framework of programming, its type and distinguishing features.</li></ul>
Critical thinking, Logic Building, Problem Solving		<ul style="list-style-type: none"><li>Deciphering data handling and processing problems in computational biology.</li><li>Assess different problem-solving approaches.</li><li>Building logical step-by-step solutions to solve biological data handling and processing problems using programming.</li></ul>
Exposure and Cross-discipline Understanding		<ul style="list-style-type: none"><li>Illustrate the implementation of programming in Biological System data handling and processing.</li></ul>
Effective Communication		<ul style="list-style-type: none"><li>Communicate ideas clearly and effectively.</li></ul>
Professional & Ethical Behaviour		<ul style="list-style-type: none"><li>Transparency, honesty and ethical reasoning in devising tools of data handling and processing.</li></ul>

### LO – PO Mapping: Correlation Levels:

1 = Slight (Low); 2 = Moderate (Medium); 3 = Substantial (High), “-“= no correlation

Sub Code: 1310203	PO1	PO2	PO3	PO4	PO5	PO6
LO1: Domain Knowledge	3	3	3	3	2	3
LO2: Critical thinking, Logic Building, Problem Solving	3	3	3	3	2	3
LO3: Exposure and Cross-discipline Understanding	3	3	3	3	2	3
LO4: Effective Communication	2	2	3	3	2	3
LO5: Professional & Ethical Behaviour	2	2	2	3	3	3

2. Course Duration: The course duration is of 30 sessions of 60 minutes each.

### 3. Course Contents:

Module No:	Module Content	No. of Sessions	70 Marks (External Evaluation)
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I	Introduction <ul style="list-style-type: none"><li>● Introduction to Programming,</li><li>● Types of programming,</li><li>● Introduction to Python, Data structure</li><li>● Editing code, types of error, error handling, Text manipulation</li></ul>	7	17
2	Conditions in Python, Exception Handling & File handling	7	17
3	List & Loops in python	7	17
4	Functions, paired data and Dictionary in python	7	16
5	Introduction to Bio python	2	3
V	Practical: <ol style="list-style-type: none"><li>1. To gain basic knowledge on programming skills in Python.</li><li>2. To know how to calculate the length of the sequence using python program.</li><li>3. To perform the reverse of the given sequence</li><li>4. To perform concatenation of the given sequence</li><li>5. To find the complement and reverse complement of the given sequence.</li><li>6. To know the GC content of the given DNA sequence in order to evaluate the stability of DNA. .</li><li>7. To convert DNA to protein coding sequence by using python program and be used in the translation process.</li><li>8. To parse PDB and FASTA file</li><li>9. Retrieving DNA Sequence from the Database and translate it into Protein coding Sequence</li><li>10. Pattern Searching</li></ol>	---	(30 marks)

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### 4. Pedagogy:

- ICT enabled Classroom teaching
- Scripts writing for biological data handling and analysis
- Practical / live assignment
- Interactive class room discussions

### 5. Evaluation:

Students shall be evaluated on the following components:

	<b>Internal Evaluation</b>	<b>(Internal Assessment – 20 Marks)</b>
<b>A</b>	● Continuous Evaluation Component	10 marks
	● Class Presence	5 marks
	● Record maintenance	5 marks
<b>B</b>	<b>Mid-Semester Examination</b>	<b>(Internal assessment-30 Marks)</b>
<b>C</b>	<b>End-Semester Examination</b>	<b>(External assessment-70 Marks)</b>

### 6. Reference Books:

No	Author	Name of the Book	Publisher	Year of Publication / Edition
1	Jason Kinser	Python for Bioinformatics	Jones and Bartlett Publishers	Latest edition
2	Martin J	Python for Biologist: A complete programming course for beginners	Createspace Independent Publishing Platform	Latest Edition

Note: Wherever the standard books are not available for the topic appropriate print and online resources, journals and books published by different authors may be prescribed.

### 7. List of Journals/Periodicals/Magazines/Newspapers / Web resources, etc

- <https://github.com/rajathkmp/Python-Lectures>
- <http://www.dalkescientific.com/writings/NBN/>

### Course Outcomes:

On completion of this course, students should be able to:

- Understand Programming and its various approaches.

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**W.E.F 2021-22**

- Understand Object Oriented Programming as used in Python as: classes, sub-classes, inheritance, encapsulation and abstraction etc.
- Develop skills to apply programming in analyzing and solving biological data.