SARDAR PATEL UNIVERSITY
Programme & Subject : B.Sc. (Bioinformatics)
Semester: IV
Syllabus with effect from: June – 2019

Paper Code: US04CBNF21	Total Credit: 4
Title of Paper: Computational Biology	**(4 lectures/wk)**

Unit	Description in detail
1	**Sequence Analysis I:** Biological sequence: Definition, Types, Pairwise alignment, Local and Global alignment, Significance of sequence alignment, Gaps: Types and their significance, similarity and distance (Hamming distance), Edit operations, alignment score, Dot matrix tool for pair wise sequence comparison. Scoring matrices: Definition, Types: Substitution matrices, Point accepted mutation (PAM) and Block substitution matrices (BLOSUM).
2	**Tools for sequence analysis**: Database similarity search- BLAST: Type, algorithm and significance. PSI-BLAST: algorithm and importance. Dynamic programming Algorithm-Needleman and Wunsch algorithm for global alignment, Smith and Watermann algorithm for local alignment.
3	**Sequence Analysis II:** Multiple sequence alignment: Definition, Types and Significance. Methods: Progressive method and Iterative method. Clustal tool for multiple sequence comparison. Basic concept and definition of sequence patterns, motifs, profiles and Block, various types of pattern representations viz. consensus, regular expression (Prosite-type) and sequence profiles; profile-based database searches using PSI-BLAST, analysis and interpretation of profile-based searches.
4	**Linux and System Development:** Introduction to O.S: Types, Charateristics, Available Options. Linux as O.S: Benfits of Linux, Structure, Kernal, file System. General Commands: ls, clear, man, date, cal, echo, cat. File and Directory Commands: mv, rm, cp, pwd, mkdir, file comparision commands, cuting and pasting. Advance Commands: head, tail, wc, bc, tee, uname, sudo, ispell, sort, merge, uniq, tr. Importance of linux OS in bioinformatics and softwares used in sequence analysis. Introduction to Perl programming.

Basic Text & Reference Books

1) David W Mount, Bioinformatics: Sequence and Genome Analysis, 2nd Edition, cold Spring Harbor Press.

2) Claverie, J.M. and Notredame C. 2003 Bioinformatics for Dummies. Wiley Editor.

3) Durbin R., Eddy S., Krogh A. and Mithchison G. 2007 Biological Sequence Analysis, Cambridge University Press.

4) Developing Bioinformatics Computer Skills By: Cynthia Gibas, Per Jambeck

5) UNIX in Nutshell by Yashwant Kanetkar

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Semester : IV
Syllabus with effect from: June – 2019

Paper Code: US04CBNF22	Total Credit: 4
Title of Paper: Animal biology	(4 lectures/wk)

Unit	Description in detail
1	**Developmental Biology** • Growth differentiation and morphogenesis: types of eggs based on amount of yolk and distribution of yolk • Early developmental processes: patterns of embryonic cleavage, extraembryonic membranes, types of placenta • Early development in drosophila: cleavage type and gastrulation • Metamorphosis: introduction, types of metamorphosis, frog metamorphosis Regeneration: introduction, types of regeneration, morpholaxis and epimorphosis
2	**Reproductive Biology** • Male and female reproductive organs • Female reproductive cycle • Fertilization and implantation of embryo • Embryonic and fetal development in brief • Metarnal changes during pregnancy • Labor • Methods of birth control
3	**Nervous System** • Major structures, function of nervous system, subdivisions of nervous system, histology of nervous tissue, classification of neurons (structural and functional), organization of nervous sytem – cns and pns, conduction of electrical signals in neurons, signal transmission at synapses, neurotransmitters • Structure of spinal cord, functions of the spinal cord and spinal nerves, reflexes and reflex arc • Human brain – major parts, protective coverings, blood supply, cerebrospinal fluid, functions of principal parts of brain, functional organization of cerebral cortex, brain waves, types of cranial nerves with location and function.
4	**Economic Zoology, Animal Behaviour And Wildlife Biology** • Apiculture, sericulture, lac culture and prawn culture • Introduction to animal behaviour, innate and learnt behaviour, social behaviour of honey bee, role of pheromones on behaviour, difference between hormones and pheromones, types of pheromones, mode of action of pheromones • Introduction to wildlife biology, brief history of gujarat wildlife, importance of wildlife, conservation of wildlife, threatened species of wildlife, sanctuary, national parks, biosphere reserves of wildlife, in citu and ex citu conservation, wildlife organizations

Basic Text & Reference Books

A text book of animal physiology by a. K. Berry

Animal physiology by m. P. Arora

Principles of anatomy and physiology by tortora and grabowsky

Economic zoology by shukla and upadhyay

Programme & Subject: B.Sc. Bioinformatics (Practical syllabus)
Semester: IV Credits--2
Syllabus with effect from: June – 2019
Paper Code: US04CBNF23

1) Pairwise sequence alignment (Dotplot)
2) Sequence alignment using Needleman Wunch algorithm, Emboss matcher
3) Multiple sequence alignment (Clustal Omega)
 4) BLAST program
5) PSI-BLAST (position specific interacted BLAST)
6) Sequence editing (Sequence Editor)
7) Basic Unix Commands and Filters
8) Perl programming and applications to bioinformatics.
1 Basic scripting.
1 Regular expressions.
1 File i/o & control statement.
1 Subroutines & functions.
1 Writing scripts for automation.

B.Sc. Bioinformatics (Practical syllabus)
Semester: IV   Total Credit:2
Syllabus with effect from: June – 2019

1. Study of types of eggs
2. Study of types of cleavage
3. Study of types of placenta
4. Birth control methods in human
5. Histology of ovary, testis, nerve fibre, spinal cord
6. Study of life cycle of honey bee, silk insect, lac insect
7. Effect of habituation of mosquito larvae
8. Study of endangered animals of gujarat
9. Project submission
10. Study tour