AIT 513   ADVANCED PROGRAMMING IN BIOINFORMATICS   3 (1+2)

Objective:
Looking to volume and complexity of biological data, advanced programming skills are required for researchers in order to get the most out of their data analyses. This course will provide the expanded programming skills necessary to develop software that can exploit the complex information landscape of bioinformatics.

Theory:
UNIT I
Introduction to Molecular Biology, Central Dogma, Sequencing technologies, etc., Introduction to different programming languages used in biological sciences,Perl , Python, R, Ruby etc.

UNIT II
Unix/Linux shell programming, Perl: Introduction, Scalar Data, Arrays and list Data, Control Structures harhes, Regular Expressions; Suboutines, File handles and file tests; Function;formats, Directory Access, Process management, Other data Transfomation; Finding a sub string, Extracting and replacing a sub string. Bio-Perl: Introduction, Architecture, Uses of bioperl ,: Introduction to python/ Bio-Python

UNIT III
R: open-source language and environment for statistical computing and graphics.

UNIT IV
Bioconductor - open-source software for the analysis of biomedical andgenomic data, mainly R packages.Analysis of microarray data, Next Generation Sequencing (NGS) data etc.

UNIT V
Parallel programming/ Computing – MapReduce , Interfaces with other languages: C, Java, Perl, Python, XML,etc. – Omega Project (www.omegahat.org) ,Formatting Data: sorting, Trasliteration Database manipulation:DBM Databases and DBM Harshes, Opening and closing DBM Harshes, Fixed-Length Random –Access Databases, Variable-Length (Text) Databases, Win32 Databases Interfaces.

Practical:
1. Unix/Linux shell scripting
2. Active perf-
3. R, Map reduce

Reference Books:
1. The R Project for Statistical Computing [http://www.R-project.org/].
2. Perl.org [http://www.perl.org/].
3. Python Programming Language [http://www.python.org/].
4. Ruby Programming Language [http://www.ruby-lang.org/].
5. Tisdall J (2001) Beginning perl for bioinformatics. O'Reilly Media, Inc.
6. Tisdall JD (2003) Mastering perl for bioinformatics. O'Reilly Media, Inc.
7. Kinser J (2008) Python for bioinformatics.Jones & Bartlett Publishers.
8. Model M (2009) Bioinformatics programming using python. O'Reilly Media, Inc.
9. JRuby [http://jruby.codehaus.org/].
10. Randal L. Schwartz, Tom Phoenix, Brian d foy. 2008. Learning Perl. O-Reilly.
11. Sriram Srinivasan. 1997. Advanced Perl Programming. O-Reilly.
12. Tim Bunce and Alligator Descartes. 2000. Prograamming the perl DBI. O-Reilly.