**III.2.8 BIOINFORMATICS**

1. **Course description:**
2. **Credit points**: 3 ECTS
3. **Time commitment:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Items | Lecture | Tutorial/  Exercise | Practice/  Assignment | Lab-work | **Total** |
| No. of hours | 15 |  |  | 15 | **30** |

1. **Prerequisites**: N/A
2. **Recommended background knowledge**: N/A
3. **Subject description:**

Provide basic background in Bioinformatics. Introduce some popular problems in bioinformatics and its application in real life such as molecular sequence databases, sequence searching, sequence alignment, etc. Equip students with some popular bioinformatics tools to solve critical problems in bioinformatics.

1. **Objectives & Outcome :**

Students will have an overview of bioinformatics field, be able to apply bioinformatics tool to solve problems in molecular biology*.*

1. **Assessment/ Evaluation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component | Attendance | Exercises | Report | Practical | Midterm | Final |
| Percentage % | 10 |  |  |  | 30 | 60 |

1. **Prescribed Textbook(s)**

[1] Bioinformatics for Dummies, Jean-Michel Claverie & Cedric Notredame, Wiley Publishing, Inc

[2] Biological sequence analysis: probabilistic models of proteins and nucleic acids, R. Durbin, S. Eddy, A. Krogh, and G. Mitchison, Cambridge University Express.

[3] Computational Biology: A Practical Introduction to BioData Processing and Analysis with Linux, MySQL, and R, Röbbe Wünschiers, Springer Berlin Heidelberg Publisher.

**II. Course content & schedule:**

1

[1] Introduction to Bioinformatics

[2] Introduction to Unix/Linux OS

2

[1] Introduction to Database, Database Management Systems, SQL language

[2] Databases of DNA, Proteins, Genomes

3

[1] Introduction to Algorithm and High-level Programming Languages

[2] String processing with Awk script

[3] Statistics programming with R

4

[1] Pairwise sequence aligment: Algorithms and Tools

5

[1] Multiple sequence aligment: Algorithms and Tools

[2] Database search:

Algorithms and Tools

6

[1] Introduction to Machine Learning: Supervised/Unsupervised Learning

[2] Classification, Clustering, Labeling

[3] Gene finding

[4] Function annotation

7

[1] Proteome and Gene Expression Analysis

[2] Next generation sequencing data analysis

8

[1] Gene ontology & graphviz

[2] Biological pathways & networks

**III. Reference Literature:**

[1]. Bioinformatics for Dummies, Jean-Michel Claverie & Cedric Notredame, Wiley Publishing, Inc

[2]. Biological sequence analysis: probabilistic models of proteins and nucleic acids, R. Durbin, S. Eddy, A. Krogh, and G. Mitchison, Cambridge University Express.

[3]. Computational Biology: A Practical Introduction to BioData Processing and Analysis with Linux, MySQL, and R, Röbbe Wünschiers, Springer Berlin Heidelberg Publisher.

[4]. Introducing Unix and Linux, Mike Joy, Stephen Jarvis, Michael Luck, Palgrave Macmillan Publishing.

[5]. Absolute Beginner s Guide to Databases, John Petersen, QUE Publishing

[6]. Beginning MySQL, Robert Sheldon, Geoff Moes, Wrox Publishing

[7]. Bioinformatics: the machine learning approach, Pierre Baldi, SÃ¸ren Brunak, The MIT Press.