# Bioinformatics 2017/2018 mod 1 Algorithms for Bioinformatics

## Objectives

Goal of the course is to provide the student with notions about the main algorithms used in bioinformatics and skills for their implementation.
At the end of the module the student should be able to: recall and discuss the algorithms presented, reading the literature about an algorithm in the same class and implement it.

## Prerequisites

General notions of algorithms and programming skills in Python

## Contents

Alignment algorithms. Pairwise sequence alignment. Global alignment. Needleman-Wunsch algorithm. Smith-Waterman Algorithm
String Distance measures. Scoring Matrices: PAM. Local alignment, BLAST.

Multiple alignment: PSI BLAST

Introduction to phylogenetics and phylogenetic trees. Distance data: ultrametric and additive matrices. Additive trees. Parsimony and quartet method.

Patterns in sequence analysis. Frequent and infrequent substrings. Hidden Markov Models.

## Teaching Methods

Frontal lessons (32 hours) and computer exercises (16 hours). During the exercises the students will be guided in the implementation of an algorithm from the literature.

## Verification of learning

Oral/written examination about the contents and practical discussion of the project developed during the exercises and its possible modifications and extensions.

## Texts

Neil C. Jones and Pavel A. Pevzner: An Introduction to Bioinformatics Algorithms (2004).
Joseph Felsenstein: Inferring Phylogenies (2004).
Hans-Joachim Böckenhauer and Dirk Bongartz: Algorithmic Aspects of Bioinformatics (2010)
Specific papers to be presented during the lectures.

## Timetable

Monday 11.30 -13.30
Tuesday 11.30 -13.30
Wednesday 14.30 -18.30
Room A215

Start: February 19 2018
End: March 28 2018

**Exam dates (tentative):**
5/6/2018
3/7/2018
The exam will be integrated with the exam of Bioinformatics Mod2.

Intermediate verification on Mod1: 4/4.

## Lecturers and contacts

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Office hours during the course: Thursday 14.00-15.00 (information on http://webapps.unitn.it/People/it/Web/Persona/PER0004537#RICEVIMENTO)

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## Other module of bioinformatics

Bioinformatics 2017/2018 mod 2 Bioinformatic Resources
please see the information online.
Start: 9/4/2018
48 hours with the same timetable
Lecturer: Toma Tebaldi + additional lecturer to be announced.