# Algorithms for the Prediction and Analysis of Biological Evolution

Record number : OPR-1403

## Overview

**RESEARCH DIRECTION**

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**INFORMATION**

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**ADMINISTRATIVE UNIT(S)**

Faculté des sciences
Département d'informatique

**LEVEL(S)**

2e cycle
3e cycle

**LOCATION(S)**

Université de Sherbrooke, campus principal

## Project Description

This bioinformatics project aims to develop algorithmic methods and software tools for predicting and analyzing biological evolution. The project lies at the intersection of bioinformatics, algorithm design, and graph theory, with concrete applications in evolutionary biology, virology, and cancer research.

Evolution is at the core of many fundamental questions in modern biology, ranging from the study of species to that of viruses and tumors. Recent advances in genomic sequencing have generated massive amounts of evolutionary data, creating a strong need for new bioinformatics tools capable of interpreting these data efficiently.

The research will focus in particular on the representation, comparison, and integration of evolutionary trees and networks used by biologists to model the evolution of organisms, viral populations, and tumor cells.

Project objectives

- Develop algorithms for reconstructing evolutionary trees and networks;
- Design methods to measure similarities and differences between alternative evolutionary hypotheses;
- Develop algorithms for combining multiple trees or networks into consensus representations that are easier to interpret;
- Implement these approaches as bioinformatics software tools usable by the scientific community.

Desired qualifications

- Strong interest in research;
- Good skills in algorithms and programming;
- Basic knowledge of graphs and networks;
- Experience with one or more programming languages (e.g., C++, Python, Java, or Rust). The choice of technologies can be discussed during the project;
- Background knowledge in biology is an asset, but not required.

The project is well suited for students interested in developing new computational methods applied to current biological problems.

For doctoral students, there is the option of joint supervision with colleagues in France, depending on the student’s interests.

## Discipline(s) by sector

### Sciences naturelles et génie

Biologie et autres sciences connexes

## Funding offered

Yes

The last update was on 15 May 2026. The University reserves the right to modify its projects without notice.