

# **Oxford Summer Projects in Computational Biology**

From July 11<sup>th</sup> until August 20<sup>th</sup> 2011, a project-based summer school in computational biology will take place in Oxford in [The Department of Plant Sciences](#). The ideal student is strong in maths/stats/compsci/phys/chem, has studied 2-3 years of an undergraduate degree, and has an interest in moving into computational biology. However, we have also successfully had students from a pure biology background, as well as students in the process of doing their PhD.

The instructors/teachers/lecturers/project designers are: [James Anderson](#), [Phil Biggin](#), [Phil Blunsom](#), [Luke Cartey](#), [Tom Cavalier-Smith](#), [Elspeth Garman](#), [David Gavaghan](#), [Jotun Hein](#), [Joe Herman](#), [Wim Hordijk](#), [Nick Jones](#), [Steve Kelly](#), [Rune Lyngsø](#), [Thomas Mailund](#), [Gil McVean](#), [Istvan Miklos](#), [Richard Mott](#), [Adam Novak](#), [Bela Novak](#), [Joe Pitt-Francis](#), [Gail Preston](#), [Miltos Tsiantis](#).

The presently planned projects will be taken from the list below. People are encouraged to propose their own projects, which has [happened](#), as long as it is well-worked through. So the list might grow if somebody has a good idea.

- [Metabolic Random Fields](#)
- [Correlated Alignment](#)
- [Phylogenomic Analysis of Algae](#)
- [Stochastic Models Combining Alignment and Annotation](#)
- [Advanced Software Design for Statistical Alignment](#)
- [Evolving Dynamical Systems: the Cell Cycle as test case](#)
- [Inverse RNA Folding Algorithms](#)
- [Stochastic Models of Leaf Shape Evolution](#)
- [Network Combinatorics](#)
- [Approximate Genealogies in Population Genomics](#)
- [Evolutionary Docking](#)
- [Comparison of Parallel Solution Techniques for the Eikonal Equation](#)
- [Ab initio Detection of Regulatory Nucleotide Elements](#)

More detailed descriptions of these can be found on this page can be found [here](#) and earlier project reports [here](#). The projects should introduce a topic, meaningful progress should be possible in the 6 weeks and could also serve as an introduction to a research question that could be pursued in a DPhil.

Students will work in groups of three with daily discussion with the instructors. There will be three presentations by each group and there should be a final report describing the work. Participation has in general been experienced as very demanding by students. There are no official credits for participation, but participation has been experienced as very rewarding as a research experience and in creating relationships with students/researchers in other countries.

In the work days in the above period, each day will start with a one hour lecture and we will hope to have given an overview of computational biology by the end of the period. But, the course will strongly focus on learning 'by doing'. There will also be one lecture describing how to enter Oxford DPhil programs. Both lectures and projects will be updated before summer. Each week is attempted to have two general teaching lectures and two research topic lectures, with the week ending with student presentations, Oxford Introduction on Fridays.

The present plan is below, but it will be modified to suit the students and chosen projects and accommodate time constraints of the lecturers:

Week 1: Introduction to summer school and computational biology, [Alignment](#), Phylogenomics of Algae, Imprinting in Mice, Student Presentations.

Week 2: [Models of substitution](#), [Phylogenies I](#), Molecular Dynamics and Function, [Leaves and their evolution](#), The 1000 Genomes Project.

Week 3: [Phylogenies II](#) [Statistical alignment](#), [Grammars and Biological Sequences](#), Genetic mapping, Dynamics Models of the Cell Cycle,

Week 4: [Networks](#), [Integrative genomics](#), Bacterial genomes and metabolism, Network Inference, Student Presentations.

Week 5: [Annotating genomes for protein genes](#), [RNA secondary structure](#), [Finding signals](#), [Computer comparison of languages and automatic translation](#), [Doing a DPhil in Oxford](#),

Week 6: [Comparative biology](#), [Genome Rearrangement](#), [Origin of Metabolism](#), Analysing protein structure, Final Student Presentations.

There are a number of scholarships to cover housing and food, but more might be available dependent on applications under review.

The deadline for applications is 1<sup>st</sup> March by email to Madeline Mitchell ([mitchell@stats.ox.ac.uk](mailto:mitchell@stats.ox.ac.uk)). A CV with university grades and two people who can be contacted for references are needed. If possible, please apply as soon as possible as there are a series of [alternative possibilities of funding](#) for named students.