



Practical Course on Phylogenetics

Faculdade de Ciências da Universidade de Lisboa

Organizers:

Computational Biology & Population Genomics Group (<http://cobig2.fc.ul.pt>)
Centre for Ecology, Evolution and Environmental Changes

Teacher: Octávio Paulo (DBA professor, cE3c researcher)

Calendar: February 1-5 2016

Duration: 36 hours

Schedule: 13h-20h, Monday-Thursday; 13h-21h Friday

Objectives:

Phylogenetics is one of the scientific areas of Biology that has grown fast and evolved in methodological terms in the last years. Its applications go from the studies of the evolution of species and populations to the least expected, as the study of the origin of the AIDS virus or seasonal cycles of the flu. The course is aimed at students and professionals that intend to get started in phylogenetic analysis as well as researchers already with some experience wanting to deepen or update their knowledge in the field. The course consists of theoretical classes as well as hands-on practical sessions using software. Participants are encouraged to bring their own sequence data for analysis.

Objectivos:

A Filogenética é uma das áreas científicas das Ciências da Vida que mais tem crescido e evoluído metodologicamente nos últimos anos. As suas aplicações vão hoje desde o estudo da evolução das espécies e populações animais até às mais inesperadas, como o averiguar da origem do vírus da Sida ou dos ciclos sazonais de Gripe.

O presente curso é destinado a estudantes ou profissionais que pretendam iniciar-se na análise filogenética e também a investigadores já com alguma experiência mas que queiram aprofundar e actualizar os seus conhecimentos. O curso consistirá em aulas teóricas alternadas com aulas práticas de utilização de software. Encorajam-se os participantes que tenham dados de sequências a trazê-los para análise.

Resume

Brief historic perspective about phylogenetics and molecular evolution. Review of the basic concepts regarding genome organization, structure and function of genes, genetic codes and mutation types.

Basic principles of phylogenetic analysis: character evolution, homologies and homoplasies, evolutionary tree types, types of data sets for analysis etc.

Methods of phylogenetic inference: parsimony, distances, maximum likelihood and Bayesians. Models of molecular evolution. Substitution rates and patterns. Methods of model selection. Search algorithms and optimization solutions. Exhaustive and heuristic searches. Analysis of the robustness of phylogenetic trees and their components. Hypothesis testing on evolutionary trees.

This course can have a recognition of 6 ECTs for FCUL PhD students enrolling in it as part of their first doctoral year. For FCUL PhD students only requiring 5 ECTs recognized in their specific PhD programmes the last 6 hours of the course are not mandatory and the certificate will be on 'Topics in Phylogenetics'.

Programa

Dia 1 – Segunda-feira

13h00 – 20h00 - Introdução à filogenética; princípios básicos; alinhamentos; Utilização de Sequencher e BioEdit para tratamento das sequências e construção de matrizes

Dia 2 – Terça-feira

13h00 – 20h00 - Inferência por máxima parcimónia e distâncias; Obtenção de sequências no Genbank; alinhamento com o Clustal, Concatenator e Mega5

Dia 3 – Quarta-feira

13h00 – 20h00 - Modelos de evolução e Máxima verosimelhança; Utilização do PAUP e RaxML para análise de máxima parcimónia e de distância e máxima verosimelhança.

Dia 4 – Quinta-feira

13h00 – 20h00 - Inferência bayesiana; Utilização de MrBayes para inferência bayesiana.

Dia 5 – Sexta-feira

13h00 – 21h00 - Bootstrap, testes e search; Aplicações dos conceitos; Análise de casos de estudo propostos pelos estudantes

Location: Departamento de Biologia Animal, FCUL

Nº (min, max) students: 15-20 students

Minimum formation: students of 'Licenciatura' (bachelor) in Biology

Directed to: PhD or MSc students in Biology, Evolution, Genetics or related areas, and postdocs and other professionals working in related topics

Fee: free for 1st year PhD students in the Doctoral programme in Biology (UL), Biodiversity, Genetics and Evolution (UL; UP) and Biology and Ecology of Global Changes (UL; UA); 300 euros for Professionals and postdocs, 250 euros for BTI, BI and PhD students and 180 euros for master and bachelor students in FCUL as well as unemployed

Deadline for applications: January 8th 2016

To apply send an e-mail to octavio.paulo@fc.ul.pt with the following information:

Name:

E-mail:

Phone:

Professional activity: Professional/Postdoc

BTI, BI, PhD student (with/ without scholarship) Lic./Master student

Academic formation:

Institution:

Student of the 1st year of Doctoral programme Biodiv (FCUL/FCUP), Biologia (FCUL) or BEAG (FCUL or UA)?:

