



Introduction to Bioinformatics for Biosystematics

About the workshop

Time: October 5-9 2015 (GNU/Linux and Bash introduction will be given October 3-4)

Place: Natural History Museum, University of Oslo

Credits: 5 ECTS. ForBio will provide all participants that pass the exam with a course certificate.

Level: PhD-level course

Registration: Registration before September 11th

Fee: No fee for ForBio members or associates.

Maximum number of participants: 26, first come – first serve

Teachers: Johan Nylander, Hans Henrik Fuxelius, Hugo de Boer

Travel and accommodation: The course is arranged by the Research School in Biosystematics – ForBio. There is no course fee for ForBio members and associates. Travel and accommodation is covered only for students or postdocs registered at *Norwegian* universities and research institutes. BioCEED and NABiS students are encouraged to apply. See <http://www.forbio.uio.no> for more information on ForBio and membership.

Course content

Basic programming skills are becoming essential for handling large datasets and performing complex analyses in biosystematics. This course aims to provide the students with tools to solve practical problems often encountered in biosystematic research. The students will be introduced to programming using Python (www.python.org), R (www.r-project.org), and SQL (e.g., <http://en.wikipedia.org/wiki/SQL>). Other programming languages may be used for specific tasks.

Learning outcomes

Upon completion of the course, the students should be comfortable working with a command-line interface, well oriented in the basics of Python, R, and SQL programming, and familiar with methods for computerized process control and data analysis.

Admission

Deadline for applications is September 11th. All students are requested to apply by filling out the ForBio course registration form at: <https://nettskjema.uio.no/answer/67306.html>

PhD-students registered at University of Oslo

PhD students from the University of Oslo who would like to take the course as a part of their theoretical syllabus for the PhD degree also need to register through Studentweb <https://studweb.uio.no/as/WebObjects/studentweb2?inst=UiO> in addition to the ForBio course registration form.

PhD-students registered at Norwegian universities other than University of Oslo:

PhD students from Norwegian universities other than University of Oslo who would like to take the course as a part of their theoretical syllabus for the PhD degree must apply for status as a visiting PhD student before *September 11th* at <http://www.mn.uio.no/english/research/doctoral-degree-and-career/phd-programme/courses/visiting-phd.html>. Please contact the student administration at the University of Oslo (studieinfo@bio.uio.no, +47 2285 6344) for more information.

PhD-students/post-docs registered at non-Norwegian universities:

The student administration at the University of Oslo does not administrate students registered at foreign universities, and PhD-students registered at non-Norwegian universities can therefore not get formal course credits from University of Oslo. However, ForBio will provide all participants that pass the exam with a course certificate.

Prerequisites

The course participants are expected to have basic knowledge in evolutionary biology and phylogenetic analyses of molecular data corresponding to BIO4200 - Molecular Evolution (<http://www.uio.no/studier/emner/matnat/ibv/BIO4200/index-eng.html>), and BIO4210 - Classification and Phylogeny (<http://www.uio.no/studier/emner/matnat/ibv/BIO4210/index-eng.html>).

You will need a laptop throughout the course. Make sure you have administrator privileges and can install software on the computer. A virtual machine (VM) containing the Linux operating system with all necessary software are going to be used throughout the course. This will require the installation of the software VirtualBox (www.virtualbox.org) and the VM *prior* to the first day of the course. More information about this will be send out to admitted students.

No programming experience is required but participants are expected to be familiar with the GNU/Linux environment and Bash (www.gnu.org/software/bash). A two day introduction will be arranged for participants with no or limited experience of GNU/Linux and Bash. Please register for the introduction in the application form.

Teaching

All lectures and computer exercises will take place at the Natural history Museum, University of Oslo. Literature: Handouts.

Schedule: October 3-4 (Saturday-Sunday): Introduction to GNU/Linux and Bash. October 5-9 (Monday-Friday): Python, R, SQL.

Exam information

Each student will have to present a written solution to a programming problem given out by the teachers during the course. The solution should be delivered within two weeks after the course ends. The solution will be marked as passed/not passed.

Any questions before that can be sent by email to hugo.deboer@nhm.uio.no

Preliminary program, (3-4) 5 – 9 October

Place: The Auditorium at the Botanical Museum (Lids' Hus), Natural History Museum, Oslo.

Map: <http://goo.gl/maps/nTYI7>

Saturday and Sunday are split in morning (10.00 – ca 12.30) and afternoon (ca 13:30 – ca 17:00) sessions with coffee breaks every now and then.

Monday to Friday are split in morning (09:00 – ca 12.30) and afternoon (ca 13:30 – ca 17:00) sessions with coffee breaks every now and then.

Teachers: Hans Henrik Fuxelius (HHF; hfluxelius@gmail.com), Johan Nylander (JN; johan.nylander@nrm.se), Hugo de Boer (HdB; hugo.deboer@nhm.uio.no)

Saturday 3/10 (for participants who signed up for the Introduction to GNU/Linux and Bash)

- *Computer setup. Ensuring that all participants have their virtual machines up and running (HHF, JN, HdB).*
- *UNIX/Linux – introducing the computational platform (JN)*
- *Bash programming (JN)*

Sunday 4/10 (for participants who signed up for Introduction to GNU/Linux and Bash)

- *Bash programming – handling files and software, and communicating with servers (JN)*

Monday 5/10

- *Welcome and introduction to the course (HdB)*
- *Introduction to bioinformatics (JN)*
- *Python – Introduction to Python (HHF)*

Tuesday 6/10

- *Python – Python standard libraries (HHF)*

Wednesday 7/10

- *Python – Python libraries for bioinformatics, BioPython (HHF)*

Thursday 8/10

- *SQL – Introduction to SQL (HHF)*
- *SQL – SQL and Python interaction (HHF)*

Friday 9/10

- *R – Introduction to the R statistical programming language (JN)*
- *R – Data exploration using R, SQL, Python (HHF, JN)*