

Statistical genetics, fall 2011

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Lecturer

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Scope

1-10 cu.

Credits by assignment sets, 5 sets, each 1cr, 3cr from a seminar. 1-2cr from Population genomics program during week 4.

You can collect credits by performing 1-5 assignment sets and by a seminar talk during the course and by listening and writing short reports from Population genomics lectures.

For getting 3cr from a seminar you also write an essay (this can be submitted later).

The course can be taken as intermediate or advanced studies in statistics.

In Bioinformatics master's program (MBI) this course is one of the advanced bioinformatics courses and the seminar can be taken as one of the compulsory seminars.

No exam; credits by assignments

Prerequisites, lectures, assignments, seminar

Prerequisites: Interest in genetics and knowledge on basic probability calculus.

Lectures: During the first three weeks only Thursdays 14-16 in room B120 and tutoring sessions with negotiable times.

Assignments: exercises, computer work, simulations.

Weeks 1-3,

- Assignment set 1.pdf, Population genetics basics I.pdf,
- Assignment set 2.pdf, Population genetics basics II. pdf, relevant background: Genetic relatedness analysis.pdf

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- Bayesian genetic analysis.pdf

- Assignment 3.pdf, **NOTE:** this dataset works: Growth hormone DNA stop codons removed.txt, submit it to Selecton and take one sequence translated into protein and submit to SIFT. And concentrate on interpreting the results.
Links to servers: <http://sift.jcvi.org/>, <http://selecton.tau.ac.il/> (for collecting data you need this: <http://www.ncbi.nlm.nih.gov/>)
 - Diagnosing mutations.pdf, Bayesian inference in selection detecting at the level of proteins.pdf, SIFT algorithm for non-synonymous mutation prediction.pdf,

Week 4,

We have the possibility to exploit the lecture program of Population genomics graduate school having an intensive course in Kumpula and topics closely related to our Statistical genetics course.

Lecturers: Matthieu Foll and Daniel Wegmann from Switzerland, Peter Tiffin from USA, Chris Wheat from UK/Viikki.

Lecture slides and other material

- M Foll, [Introduction to the coalescent.pdf](#)
- M Foll, [Extensions of the coalescent.pdf](#)
- M Foll, [Selection and coalescent.pdf](#)
- M Foll, [Practicals coalescent.pdf](#), [fastsimcoal Manual.pdf](#), <http://cmpg.unibe.ch/software/fastsimcoal/>
- D Wegmann, [Demography inference from genetic data.pdf](#), [ABC Manual.pdf](#), http://www.cmpg.iew.unibe.ch/content/software_services/computer_programs/abctoolbox/index_eng.html
- P Tiffin, Nature of data sets and signals of selection, Selection and demography in ecological contexts. Slides will be added if they come available
- C Wheat, Functional genomics of life history variation. Slides will be added if they come available.

2cr from this program: attending all lectures (10-14h) + lecture diary (short reports).

1cr from this program: attending ~half of the lectures + lecture diary (short reports).

Week 5

Tue 29. Nov, 12.30--> in computer class C128, Assignment 4 introduction

- Assignment 4.doc
 - Data analysis by this software: <http://www.ub.edu/dnasp/>, or by this: <http://cmpg.unibe.ch/software/arlequin35/>
 - Population data from here: <http://www.pypop.org/> and allele sequences here: drb1 sequences.txt

Thu 1. Dec, 14.15 -15 in B120, 15--> in computer class C128, Assignment 5 introduction

- Assignment 5.pdf, Stat gen software.pdf, Lecture slides TBA,
 - Data: UK_FIN_MEX_alignedFASTA.txt, USA_before_vacc.txt, USA_after_vacc.txt, Skand_before_vacc.txt, Skand_after_vacc.txt
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Week 6

(Tue 6. Dec is the Independence day of Finland, University is closed)

Thu 8. Dec,

Seminar presentations:

Week 7

~~Thu 15. Dec, 14.15~~ as long as needed **Wed 25. Jan 2012, 15.15 - 18 in D340; this is a meeting room in 3. floor**

Seminar presentations:

[Gene expression variance in neurology.pdf](#), Ping (not coming)

[p-values and Bayes factors in genetic association studies.pdf](#), Christian

[Markov random fields in GWAS.pdf](#), Hailin

[Epigenetics.pdf](#), Khadeeja

[Stat inference of natural selection shaping immunity genes.pdf](#), Jimmy

[Genetic variants to be discovered.pdf](#), Jian

[Genetic classification by supervised learning.pdf](#), Chunxiang (?)

Bayesian analysis of population structure, Fitsum

A family based association study, Anju (not coming)

Comparative Studies of de novo Assembly Tools for Nextgeneration Sequencing Technologies, Shafiqul

[PC-analysis and allele surfing.pdf](#)

[Gene-based tests of association.pdf](#)

[Hitchhiking of deleterious mutations.pdf](#)

[Mapping mobile elements in human genome.pdf](#)

[Selection mapping of dog phenotypes.pdf](#)

You can also suggest a topic of your own.

The presentation in December (~20-30min) can be based on only one literature reference (the one here, above, or the one you have found by yourself).

The written essay (to be submitted in January), 5-8 pages, should include ~ 3 additional references. These are the requirements for 3cr from a seminar to be registered for you. You should also follow other student's presentations.

If you want to give a presentation but not write an essay, you get 1cr.

Registration

NOTE: Information about time schedule and credits given here in the course home page is valid information and information given in Weboodi-registration page (initially constructed last spring) is not updated/valid information (i.e. getting credits is more flexible and there are more options, for example the seminar option).

Did you forget to register? [What to do.](#)