GÖTEBORG UNIVERSITY   **COURSE PLAN MSA610**
Faculty of Sciences
Mathematical Sciences

MSA610, POPULATION GENETICS, 7.5 credit points

Level: advanced

1. Authorisation

The course plan has been authorised by the vice-dean of the Department of Mathematical Sciences on November 9, 2006, to be valid from July 1, 2007.

Educational field: Mathematical Sciences

2. Educational context

The course is part of the Master Program in Mathematical Sciences. It is also open for students outside the program who meet the course prerequisites.

3. Prerequisites

A first course in probability and statistics.

4. Goals and learning outcomes

Upon completion of this course, students would have gained an insight to the interplay between various evolutionary forces shaping the observed diversity within and between related populations. They should be able
- to recognise basic population models suitable for typical patterns of genetic variation
- apply a toolbox of methods for summarizing data on genetic variation and making inference about various features of the population in question.

5. Course description

This course is an introduction to the field of population genetics with emphasis on basic mathematical and statistical models and techniques. The main topics of the course are
- Hardy-Weinberg population model, inbreeding coefficient, linkage disequilibrium
- basic population models for the effects of mutation, migration, selection
- stochastic population models incorporating genetic drift. Wright-Fisher model and Kingman's coalescent

- neutral theory of molecular evolution, Markov models of sequence divergence, tests of neutrality, gene genealogies
- elements of quantitative genetics: components of the phenotypic variance, heritability coefficients.
The course consists of lectures and homework exercises. The students are encouraged to collaborate in solving the homework problems.

6. Literature
Principles of Population Genetics by D.L.Hartl and A.G.Clark, 1997 (3rd edition). Lecture notes downloadable from the internet.

7. Assessment
Written examination.

8. Grades
The grade levels are Fail (U), Pass (G), and High Pass (VG). A wish for an ECTS grade should be reported to the examiner at the beginning of the course.

9. Course evaluation
In the middle of the course the teacher arranges a feedback discussion with the students and at the end of the course the students will be asked to answer a questionnaire. The results of the questionnaire will be processed by the teacher together with student representatives.

10. Additional information
The genetic and statistical principles underlying population genetics are for the most part simple and straightforward which makes the course suitable for two different kinds of students:
- biology students with affinity for mathematics
- students with a mathematical background, who are interested in evolutionary genetics.