Module name: Population Genetics and Molecular Evolution

Identification number	Workload	Credits	Term of studying*	Frequency of occurrence	Duration**
MN-B-BInf 1	450 h	15	1st or 2nd term of studying	Summer term, 2nd half	10 weeks

1	Type of lessons	Contact times***	Self-study times	Intended group size
	a) **Lectures** (L) b) **Practical/Lab** (P) c) **Seminar** (S)	a) 37 h b) 48 h c) 6 h	359 h (Preparing and reworking matters of L and P; Preparing seminar talk; Writing project report/essay)	a) 8 students / supervising tutor b) 4 students / supervising tutor c) 8 students / supervising tutor

2 Learning outcomes / Skills

Students who successfully completed this module will have developed an understanding of fundamental concepts and theoretical models in population genetics and molecular evolution. They will be able to measure and statistically evaluate and interpret genetic or gene expression data and put these in the context of molecular evolution. Participants will be able to independently carry out small scientific projects. Additionally, students can compile and evaluate original articles in a specific area of research and will be more exercised in the presentation of own scientific results in written and oral form. They will be skilled in the experimental generation and analysis of polymorphism data from natural populations

3 Contents

Main topics:

- principles of population genetics, molecular evolution and evolutionary developmental biology
- statistical tests of genetic data
- mathematical modeling
- intra- and interspecific comparative analyses of genome sequences
- analysis of gene expression data
- experimental extraction of microsatellite polymorphism data involving DNA amplification, sequencing and genotyping

4 Teaching methods

Lectures; Seminar; Guidance to independent research; Project work; Laboratory work; Training on presentation techniques in oral and written form

5 Requirements for participation

Bachelor; enrollment in the Master´s degree course “Biological Sciences” (see examination regulations for details)

Additionally: In-depth knowledge of quantitative methods are indispensable to participate in this module. Good mathematical skills are mandatory. Such knowledge has to be documented by at least a satisfactory mark in the module Mathematics of the BSc program in Biology or an equivalent documentation.

6 Type of examinations

Exam prerequisites: Regular and active participation; acquisition of at least 50 % of the points from course accompanying exercises

Exams: One hour written examination about topics of the lectures (accounts for 40 % of the total module mark), oral presentation (20 min + discussion, total = 40 min) of a research topic or a topic of the course (accounts for 30 % of the total module mark), written essay (accounts for 30 % of the total module mark)

7 Requisites for the allocation of credits

Total module mark at least “adequate” (see § 10 of the examination regulations for details)

Population Genetics and Molecular Evolution (MN-B-BInf 1) continued

8	**Compatibility with other Curricula** None
9	**Significance of the mark for the overall grade** In the Master´s degree course “Biological Sciences”: 15 % of the overall grade (see appendix 2 of the examination regulations)
10	**Module coordinator and Participating faculty** **Module coordinator:** Prof. Dr. T. Wiehe, phone 470-1588, e-mail: twiehe@uni-koeln.de **Participating faculty:** PD Dr. M. Hasselmann, Prof. Dr. M. Nothnagel, Prof. Dr. T. Wiehe
11	**Additional information** - **Subject module** of the Master´s degree course “Biological Sciences” - **Focus of research:** Genetics; also creditable to the research areas Evolutionary Biology or Bioinformatics - **Literature:** (i) Hamilton, M. (2009) Population Genetics. Wiley; (ii) Haubold, B., Wiehe, T. (2006) Introduction to Computational Biology. Birkhäuser - Further original papers will be handed out during the module. - **General time schedule:** Week 1-6 (Mon.-Fri.): Lectures (Mon., Wed., and Fri. 9-11 a.m.), practical/lab (Mon.-Thu.13-15 p.m.) and seminar (Week 4-6: Fri 13-15 p.m.); Week 7: Preparation for the written examination; Week 8-10 (Mon.-Fri. in the second three weeks of the break between summer and winter term): Essay writing (10-12 pages on a topic of the course) - **Introduction to the module:** June 03, 2013 at 9:15 a.m., Institute for Genetics, computer pool (ground floor) - **Written examination:** July 19, 2013; more details will be given at the beginning of the module

* According to the course schedule (see appendix 2 of the examination regulations)

** Preparation times before the official start of the module are not included here.

*** All decimal numbers were rounded. The values correspond to the effective contact times over the total duration of the module (including examination times).