Complex Trait Analysis of Next Generation Sequence Data Course
September 8-12, 2025

Max Delbrück Center for Molecular Medicine–Berlin, Germany

Each session will begin with a theoretical introduction followed by practical exercises. The instructors for the course are Suzanne Leal (Columbia University) and Michael Nothnagel (University of Cologne).

The course will be held daily from 9:00 a.m. to 5:00 p.m., except for Wednesday, when the course will end at 12:30 p.m. to have free time in for sightseeing. A welcome dinner will be held for students and faculty directly after the course on Monday at a nearby restaurant.

MONDAY September 8th	Morning	*Lecture* Aligning Sequence Data; Calling variant; Variant quality score recalibration; VCF file format and annotation
	Afternoon	*Lecture* Cloud computing; Bioinformatic annotation; Quality control for NGS data; IDB sharing and detection of related individuals, etc. *Computer Exercises* BCFtools, Annovar
	17:45 -22:00	Dinner at Il Castelo – alt Buch Karower Str. 1. 13125 Berlin
TUESDAY September 9th	Morning	*Lecture* Population history of rare and common variants *Pencil and Paper Exercises* Hardy-Weinberg Equilibrium, F_{ST}
	Afternoon	*Lecture* Association analysis testing within a regression framework for qualitative and quantitative traits-fixed effects; Population substructure and admixture, controlling for confounders including population substructure and admixture *Computer Exercises* R

WEDNESDAY	Morning	*Lecture*
September 10th		Regression analysis – statistical interactions and random effects; Linear mixed models (LMM) and generalized LMM (GLMM). *Computer Exercise* FASTLMM, R
	Afternoon	Free for sightseeing
THURSDAY	Morning	*Lecture*
September 11th		Rare variant association methods for population-based data; Analysis of rare variants using LMM/GLMM -application to population- and family-based data. *Computer Exercises* REGENIE
	Afternoon	*Lecture* Imputation of variants and their analysis; Estimation of heritability, *Computer Exercises* GCTA, LDSC regression
FRIDAY	Morning	*Lecture*
September 12th		Power analysis for common and rare variants; Pleiotropy *Computer Exercises* Genetic Power Calculator
	Afternoon	*Lecture* Polygenic risk scores *Computer Exercises* LDPRED2