

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 8 th	Morning	<i>Lecture</i> Aligning Sequence Data; Calling variant; Variant quality score recalibration; VCF file format and annotation; Visualization of next generation sequence (NGS) data
	Afternoon	<i>Lecture</i> Cloud computing, Annotation, Quality control for NGS data <i>Computer Exercises</i> BCFtools, Annovar
	17:45 -22:00	Dinner at Il Castelo – alt Buch Karower Str. 1. 13125 Berlin
TUESDAY September 9 th	Morning	<i>Lecture</i> Population history of rare and common variants <i>Computer Exercises</i> <i>Pencil and Paper Exercises</i> Hardy-Weinberg Equilibrium, F_{ST} <i>Computer Exercises</i> SFSCODE
	Afternoon	<i>Lecture</i> Association analysis testing within a regression framework for qualitative and quantitative traits-fixed effects; Controlling for confounders, Controlling for population substructure and admixture <i>Computer Exercises</i> R

WEDNESDAY September 10 th	Morning	<i>Lecture</i> Regression analysis – statistical interactions and random effects. <i>Computer Exercise</i> R
	Afternoon	Free for sightseeing
THURSDAY September 11 th	Morning	<i>Lecture</i> Rare variant association methods for population based - controlling for covariates and population substructure/admixture <i>Computer Exercises</i> REGENIE
	Afternoon	<i>Lecture</i> Analysis of rare variants using generalized linear mixed models and linear mixed models, Imputation of rare variants and their analysis <i>Computer Exercises</i> REGENIE
FRIDAY September 12 th	Morning	<i>Lecture</i> Power analysis for common and rare variants <i>Computer Exercises</i> Genetic Power Calculator
	Afternoon	<i>Lecture</i> Polygenic risk scores <i>Computer Exercises</i> LDPRED2