Complex Trait Analysis of Next Generation Sequence Data Course
September 18-22, 2023

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 1:00 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 18th	Morning	*Lecture* Aligning Sequence Data; Calling variant; Variant quality score recalibration; VCF file format and annotation; Visualization of next generation sequence (NGS) data
	Afternoon	*Lecture* Cloud computing, Quality control for NGS data *Computer Exercises* Variant Association Tools (VAT) – Part 1
	18:00 -22:00	Dinner at Il Castelo – alt Buch Karower Str. 1. 13125 Berlin
TUESDAY September 19th	Morning	*Lecture* Population history of rare and common variants *Computer Exercises* *Pencil and Paper Exercises* Hardy-Weinberg Equilibrium, F_{ST} *Computer Exercises* SFSCODE
	Afternoon	*Lecture* Association analysis testing within a regression framework for qualitative and quantitative traits-fixed effects; Controlling for confounders, Controlling for population substructure and admixture *Computer Exercises* R

WEDNESDAY	Morning	*Lecture*
September 20th		Regression analysis – statistical interactions and random effects. *Computer Exercise* R
	Afternoon	Free for sightseeing
THURSDAY	Morning	*Lecture*
September 21st		Rare variant association methods for population based - controlling for covariates and population substructure/admixture *Computer Exercises* VAT-Part 2, PSEQ
	Afternoon	*Lecture* Analysis of rare variants using generalized linear mixed models and linear mixed models, Imputation of rare variants and their analysis *Computer Exercises* REGENIE
FRIDAY	Morning	*Lecture*
September 22nd		Power analysis for common and rare variants; Polygenic risk scores *Computer Exercises* Armitage Test for Trend Power Tool, GAS, Genetic Power Calculator, LDPRED2
	Afternoon	*Lecture* Predicting functionality of variants using bioinformatics tools *Computer Exercises* CADD, FATHMM, GERP, LRT, Mutalyzer, Mutation Assessor, Mutation Taster, PhlyoP, Polyphen-2, PhastCons, PROVEAN, SIFT