

2008 Statistical Genetics Short Course

Sunday (August 31) Check-in Day

6:00pm *Welcoming Dinner*

Monday (September 1) Data Issues

8:00am - 9:00am	Registration	
9:00am - 9:15am	Introduction to Statistical Genetics Workshop and Software	[Lange]
9:15am - 10:30am	Data Types and Formats	[Sobel]
10:30am - 11:00am	<i>Break (coffee, etc)</i>	
11:00am - 11:30am	Analysis Robustness to Data Misspecification	[Papp]
11:30am - Noon	Running Mendel and Mendel Pro	[Papp]
Noon - 1:30pm	<i>Lunch</i>	
1:30pm - 2:15pm	Mistyping Analysis	[Papp]
2:15pm - 3:00pm	Consolidation of Alleles and Loci; Pedigree Trimming	[Papp]
3:00pm - 3:30pm	<i>Break (coffee, etc)</i>	
3:30pm - 4:30pm	Statistics & Genetics Primer I - Conditional Probability, Expectations, P-values, Power, Maximum Likelihood Estimates, etc	[Horvath]
4:30pm - 5:15pm	Genotype Imputation	[Lange]

Tuesday (September 2) Linkage Analysis

9:00am - 9:30am	Linkage Study Design Issues	[Sobel]
9:30am - 10:30am	IBD Probabilities, Kinship Coefficients, and Non-Parametric Linkage (NPL) Analysis	[Sobel]
10:30am - 11:00am	<i>Break (coffee, etc)</i>	
11:00am - Noon	Parametric Linkage Analysis	[Sobel]
Noon - 1:30pm	<i>Lunch</i>	
1:30pm - 2:30pm	Penetrance Estimation including General Linear Models (GLM)	[Lange]
2:30pm - 3:00pm	Analyzing Large Pedigrees using MCMC I	[Sobel]
3:00pm - 3:30pm	<i>Break (coffee, etc)</i>	
3:30pm - 4:15pm	Analyzing Large Pedigrees using MCMC II	[Sobel]
4:15pm - 5:15pm	Statistics & Genetics Primer II - Contingency Tables, Chi-squared Tests, Permutation Tests, Empirical P-values, etc	[Cantor]

Wednesday (September 3) Association Analysis

9:00am - 9:45am	Genetics and Linkage Equilibrium - Measures and Tests	[Cantor]
9:45am - 10:30am	Case/Control Association Tests	[Cantor]
10:30am - 11:00am	<i>Break (coffee, etc)</i>	
11:00am - Noon	Haplotypes - Frequency Estimation and Family-based Imputation	[Lange]
Noon - 1:30pm	<i>Lunch</i>	
1:30pm - 2:30pm	Estimating Ethnic Admixture	[Sinsheimer]
2:45pm - 6:00pm	<i>Local Excursion</i>	

Thursday (September 4)**Association Analysis continued**

9:00am - 9:30am	Association Study Design Issues	[Horvath]
9:30am - 10:30am	Family-based Association Tests I	[Horvath]
10:30am - 11:00am	<i>Break (coffee, etc)</i>	
11:00am - Noon	Family-based Association Tests II, including Gamete Competition	[Horvath]
Noon - 1:30pm	<i>Lunch</i>	
1:30pm - 3:00pm	Genome-wide Association Studies (GWAS)	[Cantor]
3:00pm - 3:30pm	<i>Break (coffee, etc)</i>	
3:30pm - 4:15pm	Association Tests given Linkage	[Sinsheimer]
4:15pm - 5:15pm	Introduction to Quantitative Analysis	[Sinsheimer]
6:00pm	<i>Course Dinner</i>	

Friday (September 5)**Quantitative Trait Analysis**

9:00am - 10:30am	Polygenic QTLs - Variance Component Analysis	[Sinsheimer]
10:30am - 11:00am	<i>Break (coffee, etc)</i>	
11:00am - 11:30am	eQTL Mapping	[Sinsheimer]
11:30am - Noon	Association Tests for Quantitative Traits	[Lange]
Noon - 1:30pm	<i>Lunch</i>	
1:30pm - 3:00pm	Network Analysis: Integrating Expression Level and Marker Data	[Horvath]
3:00pm - 3:30pm	<i>Break (coffee, etc)</i>	
3:30pm - 4:30pm	Demonstration of Mendel Enterprise	[Papp]
4:30pm - 5:00pm	Audience Questions Addressed, Future Directions, and Final Overview	[Lange]

Saturday (September 6)**Check-out Day**Background Reading

Suggested background reading in genetics includes Human Molecular Genetics (HMG), by Tom Strachan and Andrew Read. In the 3rd edition, the relevant chapters are: 4, 13, 14, and 15 (with chapter 18 also of interest to some participants). In the older 2nd edition, the relevant chapters are: 3, 11, 12, and 19 (chapters 15 and 17 also may be of interest to some).

Suggested background reading in statistics includes The Cartoon Guide to Statistics, by Larry Gonick and Woollcott Smith. A more theoretical work is Mathematical and Statistical Methods for Genetic Analysis, by Kenneth Lange, the lead instructor in this course. An alternative theory book is Statistical Methods in Genetic Epidemiology, by Duncan Thomas; in particular, chapter 4 provides an overview of relevant statistical principles. Finally, the chapters in HMG (see above) covering gene mapping are a good basic introduction to statistical genetics, particularly chapters 13, 14, and 15 in the 3rd edition.