

Growing list of questions –

### **Genetic epidemiology**

- What is genetic epidemiology and what are the similarities / dissimilarities with epidemiology?
- What are the different faces of genetic epidemiology? What are the associated key questions and main stream type of analysis techniques used to answer these questions?
- Can you give some examples of appropriate designs for each of these faces? Motivate
- How is heritability defined (broad sense / narrow sense)?

### **Population genetics**

- What is Hardy-Weinberg equilibrium and which factors may generate deviations from Hardy-Weinberg equilibrium?
- What does selection mean? Can it come in different flavors?
- How can the extent of population substructure be quantified? Why is it studied in the context of genetic epidemiology?
- What is linkage disequilibrium and how can it be measured? Why is this concept important in the context of genetic epidemiology?

### **Genetic association studies with unrelated individuals**

- What are typical quality control procedures for these types of studies?
- What is population stratification and how can it be dealt with in case-control genetic association studies?
- What is the multiple testing burden? Does it only relate to genetic association tests or also to HWE tests? What are conventional stringent thresholds to compare p-values with?
- What is cryptic relatedness and how does it fit into the picture of genetic association studies?

### **Genetic association studies with RELATED individuals**

- What advantages / disadvantages can family-based association studies give compared to genetic association studies of unrelated individuals?
- What are the basic characteristics of a TDT (transmission disequilibrium test) and the more general FBAT test? (link to “covariance”, “checking over-transmissions of an allele from a heterozygous parent”, distribution based on conditional expectation of children’s genotypes conditional on parental genotypes)
- Are FBAT tests robust to population stratification? Are regression-based tests (taking into account family-relationships to account for correlated phenotypes within families) robust to population stratification?
- Is it possible to implement a family-based screening approach that largely reduces the multiple testing burden?

### **Gene-gene interaction studies**

- What does epistasis mean? Do different definitions exist depending on the “context”?
- What is the difference between biological and genetic epistasis?