**Winter School 2023**

**Module 4 Genetic Epidemiology**

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| **Day 1** (Tuesday June 20th, 1-5pm): |
| 1:00pm-1:10pm | **Welcome** | Nicole Warrington |
| 1:10pm-2:30pm | **Lecture 1: Introduction to Structural Equation Modelling.** We will introduce the technique of structural equation modelling. Concepts that will be covered include full information maximum likelihood (FIML), optimization, path analysis and covariance algebra. We will discuss examples of structural equation modelling for genetically informative data. | Baptiste Couvy-Duchesne |
| 2:30pm-3:00pm | **Break** |
| 3:00pm-3:30pm | **Lecture 2: Introduction to Structural Equation Modelling continued** | Baptiste Couvy-Duchesne |
| 3:30pm-4:45pm | *Practical 1: Deriving expected covariances using path models and covariance algebra* | Nicole WarringtonAll speakers |
| 4:45-5:00pm | **Questions and Discussion** |
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| **Day 2** (Wednesday June 21st, 8am-12pm): |
| 8:00am-9:00am | **Lecture 3: Directed Acyclic Graphs (DAGs)**. We will introduce Directed Acyclic Graphs and illustrate how they can be used to inform study design, analysis of data and understand the implications of confounding, bias and missing data. | Gunn-Helen Moen |
| 9:00am-10:00am | **Lecture 4: Introduction to Mendelian randomization.** We will introduce the concept of Mendelian randomization, the assumptions underlying the approach, and empirical examples involving application of the method. | Daniel Hwang |
| 10:00am-10:30am | **Break** |
| 10:30am-11:45pm | *Practical 2: Single sample Mendelian randomization.* Software: R. | Geng WangAll speakers |
| 11:45am-12:00pm | **Questions and Discussion** |
| 12:00pm-1:00pm | **Lunch break** |
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| **Day 3** (Thursday June 22nd, 8am-12pm): |
| 8:00am-9:30am | **Lecture 5: Sensitivity Analyses in Mendelian randomization.** We will introduce methods for detecting and/or correcting for horizontal pleiotropy in Mendelian randomization analyses including heterogeneity testing, MR Egger, MR weighted median and MR modal approaches. | Nicole Warrington |
| 9:30am-10:00am | **Break** |
| 10:00-11:30am | *Practical 3:* Two sample Mendelian randomization. Software: R. | Chris Flatley/Nicole WarringtonAll speakers |
| 11:30am-12:00pm | **Questions and Discussion** |
| 12:00pm-1:00pm | **Lunch break** |