2019 SISMID Module 8:
Microbiome Data Analysis

Instructors:
Alexander V. Alekseyenko [Alex] (alexander.alekseyenko@gmail.com)
Paul Joseph McMurdie [Joey] (joey711@gmail.com)

Important:

We strongly recommend to do the following before the start of the course:

1. Download and install the latest version of R: https://www.r-project.org
2. Download and install the latest version of RStudio Desktop: https://www.rstudio.com/products/rstudio/download/
3. Run the installer script: SISMID2019-install-packages.R

Course page: https://www.biostat.washington.edu/suminst/sismid2019/modules/MD1908

Monday, July 15 8:00am – Wednesday, July 17 12:00pm

8:00 am – 8:30 am Coffee
8:30 am – 10:00 am Class Session
10:00 am – 10:30 am Break
10:30 am – 12:00 pm Class Session
12:00 pm - 1:30 pm Lunch Break
1:30 pm – 3:00pm Class Session:
3:00 pm – 3:30 pm Break
3:30 pm – 5:00 pm Class Session

Tentative list of topics:

1. Introduction: Metagenomics in Biology and Medicine; Metagenomics assays and upstream informatics
2. Descriptive statistics, normalizations & testing
3. Mixture models for microbiome data
4. Combining Trees and other Data
5. Ecological distance metrics; Principal Coordinates Analysis
6. Generalized multivariate analysis of variance
7. Machine learning with microbiome data
8. Mediation analysis with microbiome data*
9. Predicting metagenomic composition from 16S survey data*

Tentative list of laboratory exercises:

1. Preprocessing sequences with DADA2
2. Quality control, transformations, filtering, univariate testing, multiple comparison
3. Mixture models for differential abundance testing
4. Data and network manipulation with phyloseq
5. Computing distance matrices; PCoA
6. Distance-based multivariate analysis of variance
7. Clustering and classification
8. Multivariate mediation analysis*
9. Working with functional data*

**Time permitting*