July 19 (Tuesday)

9 ­ 9:30AM: Informal gathering / breakfast.

9:30 ­ 12:30: Joshua Vogelstein

Session 1 Topic 1: Introduction to Brain Graphs

1. What’s a graph?
2. What’s a connectome/brain-graph and what are they useful for?
3. How do we estimate connectomes?
4. Now that we have them, what are we going to do with them?
5. What software enables us to estimate/analyze connectomes?

Suggested Reading:

[Statistical Analysis of Network Data: Methods and Models](https://smile.amazon.com/Statistical-Analysis-Network-Data-Statistics/dp/144192776X/ref=sr_1_1?ie=UTF8&qid=1468857258&sr=8-1&keywords=Eric+D.+Kolaczyk), Ch 1 & 2

[Imaging human connectomes at the macroscale](http://www.nature.com/nmeth/journal/v10/n6/full/nmeth.2482.html)

[Mapping brain circuitry with a light microscope](http://www.nature.com/nmeth/journal/v10/n6/abs/nmeth.2477.html)

[Cellular-resolution connectomics: challenges of dense neural circuit reconstruction](http://www.nature.com/nmeth/journal/v10/n6/abs/nmeth.2476.html)

12:30 ­ 1:30: Lunch break

1:30 ­ 5PM: Joshua T. Vogelstein ­

Session 2: Connectomes = Samples from Random Brain Graphs

1. What’s a random graph and why do we care?
2. What’s an Erdos-Renyi Random Graph?
3. What’s a Stochastic Block Model Random Graph?
4. What’s an Exponential Family Random Graph?

Suggested Reading:

[A Survey of Statistical Network Models](http://www.nowpublishers.com/article/Details/MAL-005)

Lab Session:

* Writing down statistical network models
* Simulating models with different sets of parameters
* Exploring the equivalence of different models

July 20 (Wednesday)

9 ­ 9:30AM: Informal gathering / breakfast.

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Session 2: Connectome Estimation

1. What are ‘brain-node’ and ‘brain-edges’?
2. How do I estimate brain-graphs from fMRI data?
3. How do I estimate brain-graphs from dMRI data?

Suggested Reading:

[MIGRAINE: MRI Graph Reliability Analysis and Inference for Connectomics](http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=6736878)

[An automated images-to-graphs framework for high resolution connectomics](http://journal.frontiersin.org/article/10.3389/fninf.2015.00020/full)

12:30 ­ 1:30: Lunch break

1:30 ­ 5PM: Joshua T. Vogelstein ­

Lab Session:

* Downloading a graph
* Estimating Graphs
* Exploring Graphs
* Quality Control

<http://docs.neurodata.io/nddocs/mrgraphs/>