PART 1: FOUNDATIONS

Fri	2-Sep	**Introduction I: Reproducibility and Transparency**

Read and be prepared to discuss:
Record Keeping: Laboratory Notebooks
Record Keeping: Algorithms
Record Keeping: Data

Sign up for the following accounts (if you haven't already) and comfirm on <Google sheet>:
LabArchives (through Penn)
GitHub
PennBox (through Penn)

Come prepared to discuss from your own lab experiences an example of either: 1) good recordkeeping, or 2) poor recordkeeping

Mon	5-Sep	**LABOR DAY -- NO CLASS**

Wed	7-Sep	**Introduction I: Overview and Goals**

Readings:
1. Platt, J.R. (1964) Strong Inference: Certain systematic methods of scientific thinking may produce much more rapid progress than others. Science146, 347-353.

Come prepared to discuss from your own lab expereinces, or from a study you have learned/read about, an example of either: 1) strong inference, or 2) not strong inference

2. Kass, R.E. (2011) Statistical Inference: The Big Picture. Statistical Science 26(1).

Come prepared to describe from the paper: 1) a topic that you have already learned/understand well, and 2) a topic that is new to you and/or is not clear from the description in the paper.

Fri	9-Sep	**Introduction III: Frequentist versus Bayesian Approaches**

Go through the following tutorial and complete exercises 1 and 2. Post your answers to GitHub.
Frequentist versus Bayesian approaches

Mon	12-Sep	**Data Visualization I: Principles (Dávila)**

Wed	14-Sep	Data Visualization II: Examples (Dávila)	Find a figure/graph from a paper you think displays the distribution of their data well or poorly. Post it in the Canvas course discussion.
Fri	16-Sep	Probability Distributions I: Concepts	Go through the following tutorials, then: 1) find a paper that shows data thought to come from one of these distributions, and 2) write code to simulate data that (roughly) match the distribution shown in the paper. Post your answers to GitHub. Samples and Populations Probability Distributions Overview Bernoulli Distribution Binomial Distribution Exponential Distribution Gaussian (Normal) Distribution Poisson Distribution Student's t Distribution
Mon	19-Sep	Probability Distributions II: Binomial Distribution Case Study	Complete the exercises from the Neuroscience Example ("Quantal release") case study in the Binomial distribution tutorial and post your answers to GitHub Binomial Distribution
Wed	21-Sep	Probability Distributions III: Confidence Intervals and Bootstrapping	Go through the following tutorial, then complete the Exercises and post your answers to GitHub: Confidence Intervals and Bootstrapping
Fri	23-Sep	Two-Sample Inference I: Experimental Design and Power Analysis	Read and be prepared to discuss: Button et al (2013), Power failure: why small sample size undermines the reliability of neuroscience Go through the following tutorial, then complete the Exercises and post your answers to GitHub: Error Types, P-Values, False-Positive Risk, and Power Analysis

Mon	26-Sep	Two-Sample Inference II: Parametric Tests and Multiple Comparisons	Go through the following tutorials, then complete the Exercises and post your answers to GitHub: t-tests Multiple comparisons

Wed	28-Sep	Two-Sample Inference III: Nonparametric Tests	Complete and be prepared to discuss this Colab tutorial: Simple Non-Parametric Tests

Fri	30-Sep	Measures of Association I: Correlation	Go through the following tutorials, then complete the parametric correlation coefficient exercises and post your answers to GitHub. Measures of association Parametric correlation coefficient Nonparametric correlation coefficient Optional: Review the code in the NGG GitHub Repository under "Examples/LC-Pupil/" that was used to generate Fig. 3 of Joshi et al.

Mon	3-Oct	Measures of Association II: "Nonsense correlations"	Read and be prepared to discuss: Nonsense Correlations in Neuroscience Code to generate figures is here

Wed	5-Oct	Measures of Association III: Simple Linear Regression	Gol through the following tutorials, then complete the linear regression exercises and post your answers to GitHub. Measures of association Simple linear regression

Fri	7-Oct	QNC Modeling I: LATER Model Case Study	Read and be prepared to discuss: Noorani (2014) Some more readings just for fun: RT at Penn I RT at Penn II RT at Penn III

Mon	10-Oct	QNC Modeling II: RT Data Visualization	Run the Matlab tutorials in the NGG GitHub Repository under "Examples/LATER model/laterTutorial_plot*" Repository link
Wed	12-Oct	QNC Modeling III: Model Fitting	Run the Matlab tutorials in the NGG GitHub Repository under "Examples/LATER model/laterTutorial_modelFits and laterTutorial_modelParameters" Repository link

PART 2: APPLICATIONS (STUDENT PRESENTATIONS)

Fri	14-Oct	PRESENTATION 1: HYPOTHESES AND EXPERIMENTAL DESIGN
Mon	17-Oct	
Wed	19-Oct	
Fri	21-Oct	
Mon	24-Oct	
Wed	26-Oct	
Fri	28-Oct	
Mon	31-Oct	

Wed	2-Nov	PRESENTATION 2: DATA VISUALIZATION
Fri	4-Nov	
Mon	7-Nov	
Wed	9-Nov	
Fri	11-Nov	
Mon	14-Nov	
Wed	16-Nov	
Fri	18-Nov	

Mon	21-Nov	PRESENTATION 3: HYPOTHESIS TESTING
Wed	23-Nov	
Fri	25-Nov	THANKSGIVING -- NO CLASS
Mon	28-Nov	
Wed	30-Nov	

Fri	**2-Dec**	
Mon	**5-Dec**	
Wed	**7-Dec**	
Fri	**9-Dec**	