

BPHS 4090 Lab 3

(09.30.14)

Overview

The third lab has students independently identifying an experimental approach and getting together the setup they need to explore such. The focus here is to develop a deep understanding of the methodology, as well as its capabilities and limitation. Students must use their methodology/approach in some context to quantitatively assess the capabilities. This lab will require an oral presentation that details the methodology and subsequent analysis approach (in addition to detailed lab book notes). While you are encouraged to get feedback from your peers, this is ultimately an independent project. If you feel that the nature of your chosen path is best suited for a team (i.e., partners), you will need to present an effective case for such to the course instructors in order to receive an exception from this rule. Ideally, but not necessary, your work in Lab 3 will lead into the hypothesis-driven focus of Lab 4.

Oral Presentations

- These will take place in class on 10/28/14.
 - Format is as follows: In-class, 11 minutes long, 4 minutes for questions. These time requirements will be strictly enforced.
 - You are highly encouraged to turn your slides in on 10/27 so Prof. Bergevin can get them ready for presentation. You can instead bring a flashdrive on 10/28 if you so choose, but if any problems arise (e.g., formatting issues), you could be heavily penalized (i.e., you only get one chance).
 - Follow the same principles as developed in BPHS 3090 (Winter 2014) for the H.H. project. For example, your project should not contain more than 8 slides.
 - Your presentation should accomplish several things:
 - o clearly explain the methodology you've chosen to investigate
 - o demonstrate your mastery over such
 - o clearly present a quantitative analysis showing the capabilities of such an approach
- > 11 min. is not much time to effectively convey the depth you've developed, so you need to choose very carefully how to construct your presentation and make sure to practice, as well as anticipate potential questions.
- It is likely that you will be asked a challenging question (based upon your chosen methodology and presentation), so be prepared to respond in a concise fashion given the time limits. It is crucial to effectively demonstrate your attempt to master what you have chosen to focus on! Note: You will also be required to turn in your lab book. It is expected that such will contain detail notes on your approach, progress, and analysis. As such, your lab book will form a substantial part of your grade here. See course website for references regarding characteristics of good lab book management.

Some (additional) ideas to consider

- Electric circuit construction
 - o synchronization of chaos
 - o nonlinear oscillations

- o simulate a (rudimentary) neural network
- Sound recording/analysis
 - o vocal tract mechanics
 - o OAEs
- Optical tweezers (e.g., careful/novel force calibration routines)
- Numerical simulations
 - o quantifying pattern formation (e.g., fractal nature of branching, stripes on a tiger, etc...)
 - o nonlinear oscillators
- Cellular electrophysiology
- X-ray crystallography
- Brownian motion and particle tracking
- Detailed image analysis
- Design a means to calibrate the spectrometer and test: linearity, frequency response
- (much) More in-depth approach to the experiments used for Labs 1-2 (unless permitted by the instructor, you should not use one of the setups you already used)
- Something else altogether different?? (i.e., a project you cook up on your own)
- It's possible, with the support of a faculty member, to focus upon something in a different lab/faculty. Ask the 4090 course instructor for permission if you think you have something you'd like to pursue