



Pre-Lab

Audience

This lab is appropriate for undergraduate biology students (200 level and up) and advanced high school students (completed AP Biology and advanced electives).

Important Terms

Here are some important terms you may already be familiar with as well as some resources to review before watching the presentation. If you are unfamiliar with any of these terms, please look them up before watching the presentation.

- Sequence read (as in high-throughput sequencing read)
- Expression (as in gene expression)
- Transcript (as in mRNA transcript)
- Normalization (statistics)
- Linear model (statistics)
- Ontology (as in gene ontology)

Bioinformatics Lab Computer Setup

To follow along with this laboratory you will need:

1. Access to an up-to-date web browser such as Chrome or Firefox.
2. (Required) A *DNA Subway* account through *CyVerse* to use *DNA Subway Green Line*. To get a free account, go to <https://user.cyverse.org/>

Resources

Scientific papers (open access)

Differential analysis of RNA-seq incorporating quantification uncertainty
<https://www.nature.com/articles/nmeth.4324>

Ensembl database (human)

https://useast.ensembl.org/Homo_sapiens/Info/Index

ShinyGO v0.61: Gene Ontology Enrichment Analysis

<http://bioinformatics.sdstate.edu/go/>



DNA Subway

Green Line Walkthrough: https://learning.cyverse.org/projects/dnasubway_guide/en/latest/step7.html

Laboratory Questions

These questions can be completed by watching the video.

1. What is the difference between alignment and pseudoalignment?
2. Why do we have to take into account the gene length and the sequencing depth in determining the abundance of gene expression?
3. Why is “differential expression” a potential misnomer?
4. What is a gene ontology and how can it be used to help us interpret Sleuth results?