

Bio 304: Biological Data Analysis

Instructor: Paul Magwene

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Teaching Team

- ▶ Dr. Paul Magwene
 - ▶ Faculty member, Department of Biology, Molecular Genetics and Microbiology
 - ▶ Director, Computational Biology & Bioinformatics graduate program
- ▶ Paul Wang
 - ▶ Class of 2019, Biology Major

Modern biological data is. . .

- ▶ Heterogeneous (sequence data, species distributions, protein concentrations, etc)
- ▶ High-dimensional (genome-wide, GIS, etc)
- ▶ Copious (time series, huge population surveys, etc)

To effective analyst of biological data you must have. . .

- ▶ Biological knowledge and intuition – What does the data mean? What are the key questions? What are interesting patterns or findings in the data?
- ▶ Computational skills – sort, filter, transform, and transform data and work with in an efficient and reproducible manner
- ▶ Statistical skills – build and interpret quantitative statements (models) about patterns in your data, distinguish interesting “signal” from “noise” of natural biological variability and experimental design

The goal of this course is to...

- ▶ Teach you foundational statistical and computational skills to effectively explore and analyze complex biological data when used in combination with your biological knowledge and intuition

Specific learning objectives

- ▶ Learn to visualize and explore complex biological data
- ▶ Generate publication quality figures and tables
- ▶ Understand and apply various descriptive statistics for describing trends in data
- ▶ Understand and apply statistical tests and models such as t-tests, ANOVA, linear regression, chi-squared tests
- ▶ Carry out data exploration and analyses in a reproducible and documentable way

Conceptual Overview of Data Analysis Cycle

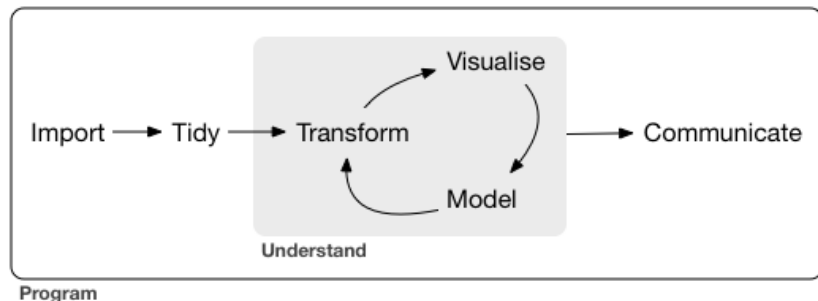


Figure 1: Data Analysis Cycle

from Wickham and Golemund 2017

See course wiki for...

- ▶ Instructor contact information
- ▶ Office hours
- ▶ Texts
- ▶ Syllabus
- ▶ Grading
- ▶ Expectations and Policies

Short URL: tinyurl.com/bio304wiki

Data Story: Passengers on the Titanic

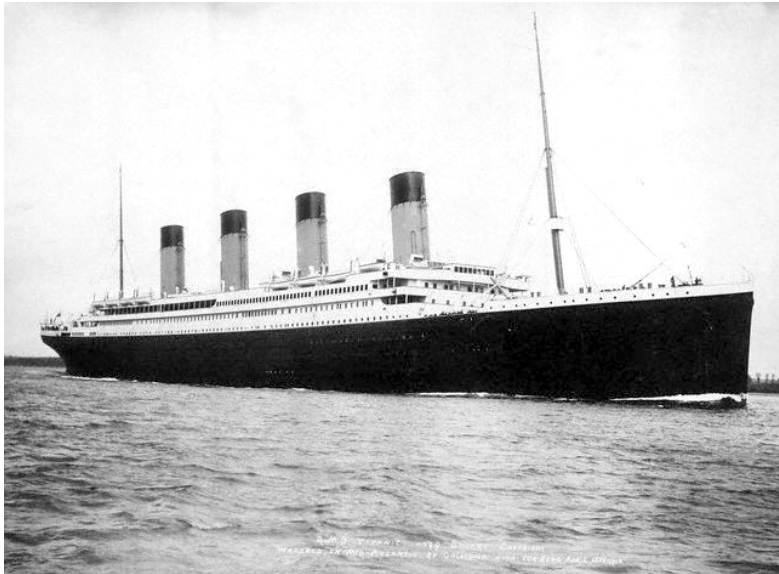


Figure 2: RMS Titanic