

# Bio 304: Biological Data Analysis

Instructor: Paul Magwene

Fall 2018

# Agenda

- ▶ Introduce the teaching team
- ▶ What this course is about
- ▶ Example data story: The Sinking of the Titanic

# 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

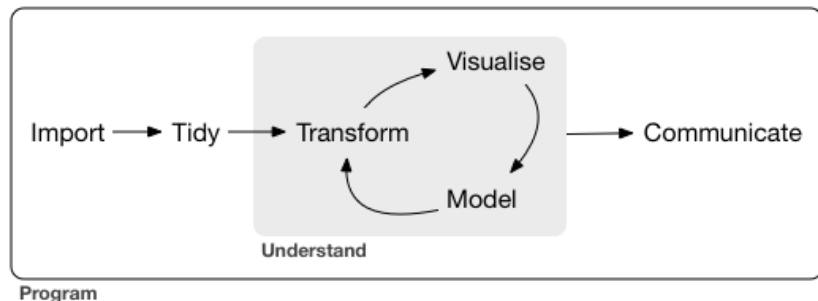


Figure 1: Data Analysis Cycle

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](https://tinyurl.com/bio304wiki)

# Data Story: Passengers on the Titanic

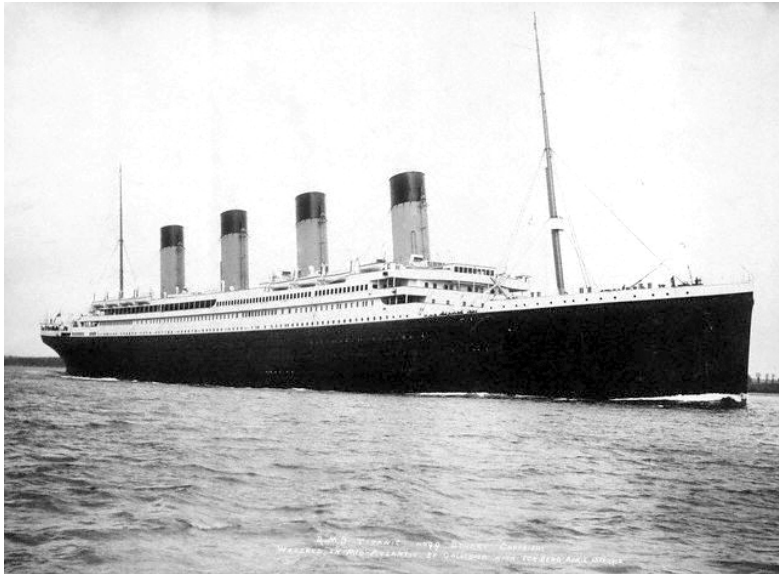


Figure 2: RMS Titanic