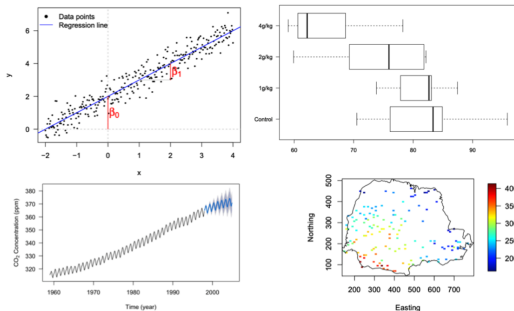


Lecture 0

Course Overview

DSA 8020 Statistical Methods II

Whitney Huang
Clemson University



About the Instructor

About the Instructor

- Sixth-year Assistant Professor of Statistics
- Born in Laramie, Wyoming, grew up in Taiwan



- Got a B.S. in Mechanical Engineering, switched to Statistics in graduate school



- Ph.D. in Statistics at Purdue, two-year postdoc at Research Triangle, NC and Victoria, Canada



University
of Victoria

How to reach me?

- **Email:** wkhuang@clemson.edu
- **Office:** O-221 Martin Hall
- **Office Hours:** Wednesdays [8:00pm - 9:00pm ET](#) via Zoom and by appointment

Class Policies

- There will be [three projects](#). The due dates are:
 - **Project I:** Feb. 20, Thursday
 - **Project II:** Apr. 3, Thursday
 - **Project III:** May 1, Thursday
- There will be [weekly R Labs](#):
 - To be uploaded to Canvas by [11:59 pm ET](#) on the due dates
 - Worst grade will be dropped
- No lectures in the week Mar. 17-21 ([Spring Break](#))

- Course syllabus / Announcements
- Lecture slides/notes/videos
- R Sessions/Labs/Projects
- Data sets for lectures and labs

- *Linear Models with R*, 2nd Edition, Julian Faraway, 2014 [\[Link\]](#)
- *An Introduction to Statistical Learning: with Applications in R*, 2nd Edition, Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, 2021 [\[Link\]](#)
- *Extending the Linear Model with R*, 2nd Edition, Julian Faraway, 2016 [\[Link\]](#)
- *A First Course in Design and Analysis of Experiments*, Gary Oehlert, 2010 [\[Link\]](#)
- *Design and Analysis of Experiments*, 2nd Edition, Angela Dean, Daniel Voss, and Danel Draguljic, 2017 [\[Link\]](#)

Evaluation

Grades will be weighted as follows:

R Labs	25%
Project I	25%
Project II	25%
Project III	25%

Final course grades will be assigned using the following grading scheme:

≥ 90.00	A
88.00 ~ 89.99	A-
85.00 ~ 87.99	B+
80.00 ~ 84.99	B
78.00 ~ 79.99	B-
75.00 ~ 77.99	C+
70.00 ~ 74.99	C
68.00 ~ 69.99	C-
≤ 67.99	F

We will use software to perform statistical analyses.

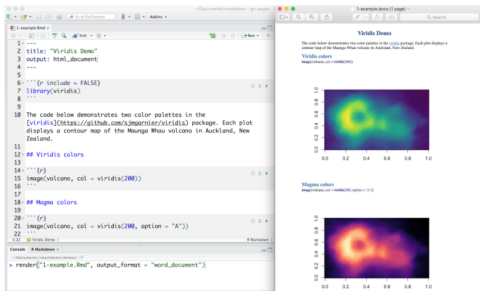
Specifically, we will be using [R/Rstudio](https://www.r-project.org/)   RStudio

About the Instructor

Class Policies

Class Overview

- a **free/open-source** programming language for statistical analysis
- available at <https://www.r-project.org/> (R); <https://rstudio.com/> (Rstudio)
- We will use **R Markdown** for homework assignments



The screenshot shows the RStudio interface. The left pane contains R code for an R Markdown document. The right pane shows the rendered output, including a title, a code chunk, and two contour plots of the Mungo Whou volcano. The top plot is titled "Viridis colors" and the bottom plot is titled "Magma colors". Both plots show a contour map of the volcano with a color gradient from purple to yellow.

```
1 ----
2 title: "Viridis Demo"
3 output: html_document
4 ----
5
6 [r-include = FALSE]
7 library(viridis)
8
9
10 The code below demonstrates two color palettes in the
11 [viridis](https://github.com/jrnier/viridis) package. Each plot
12 displays a contour map of the Mungo Whou volcano in Auckland, New
13 Zealand.
14
15 # Viridis colors
16 [r]
17 image(volcano, col = viridis(200))
18
19 # Magma colors
20 [r]
21 image(volcano, col = viridis(200, option = "A"))
22
23 [r]
```

Viridis Demo

The code below demonstrates two color palettes in the `viridis` package. Each plot displays a contour map of the Mungo Whou volcano in Auckland, New Zealand.

Viridis colors

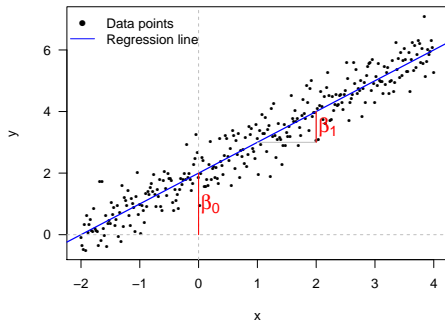
`image(volcano, col = viridis(200))`

Magma colors

`image(volcano, col = viridis(200, option = "A"))`

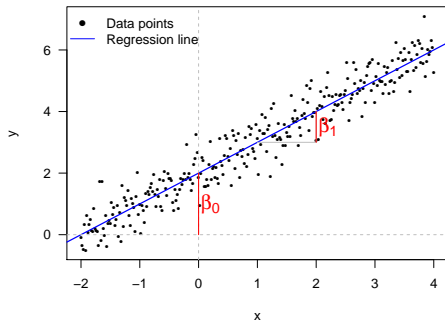
Class Overview

Part I: Regression Analysis (Week 1 - Week 7)



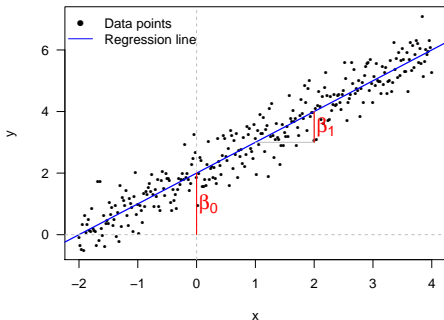
- Multiple Linear Regression

Part I: Regression Analysis (Week 1 - Week 7)



- Multiple Linear Regression
- Regression with Quantitative and Qualitative Predictors

Part I: Regression Analysis (Week 1 - Week 7)



- Multiple Linear Regression
- Regression with Quantitative and Qualitative Predictors
- Nonlinear and Non-parametric Regression

Part I: Regression Analysis (Week 1 - Week 7)

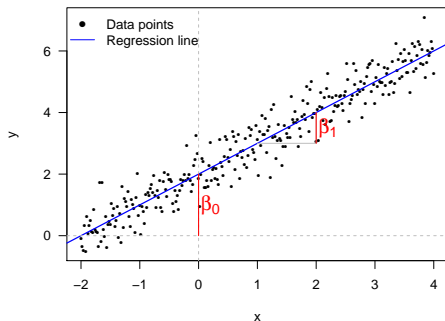
Course Overview

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About the Instructor

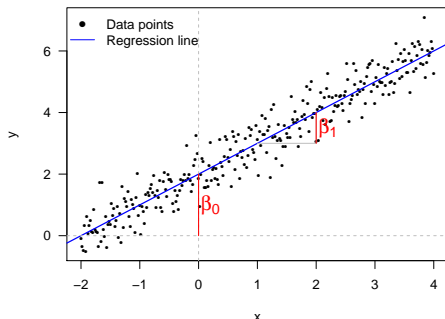
Class Policies

Class Overview



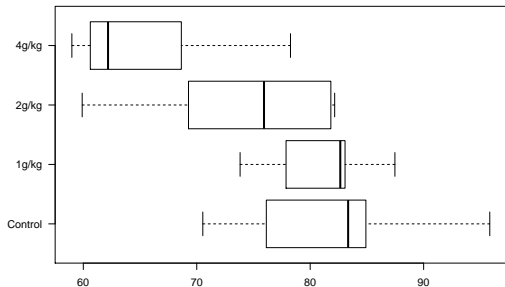
- Multiple Linear Regression
- Regression with Quantitative and Qualitative Predictors
- Nonlinear and Non-parametric Regression
- Ridge Regression and Lasso

Part I: Regression Analysis (Week 1 - Week 7)



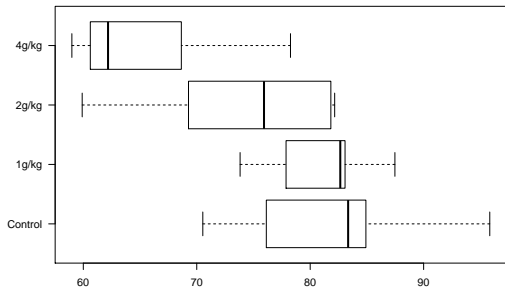
- Multiple Linear Regression
- Regression with Quantitative and Qualitative Predictors
- Nonlinear and Non-parametric Regression
- Ridge Regression and Lasso
- Logistic Regression and Poisson Regression

Part II: Experimental Design (Week 8 - Week 12)



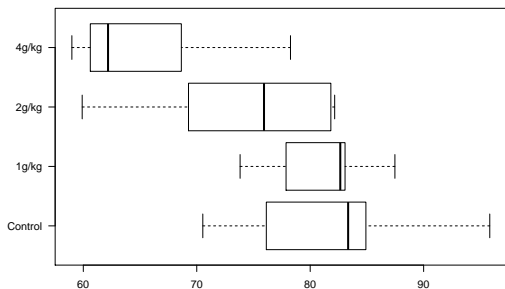
- Introduction to Experimental Design

Part II: Experimental Design (Week 8 - Week 12)



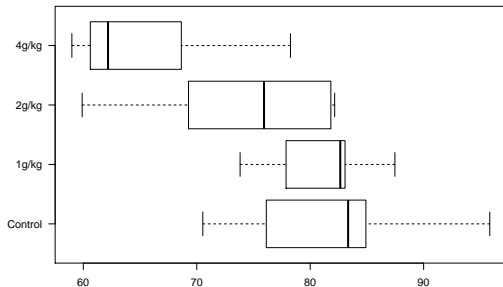
- Introduction to Experimental Design
- Completely Randomized Designs, Block Designs, Nested and Split-Plot Designs

Part II: Experimental Design (Week 8 - Week 12)

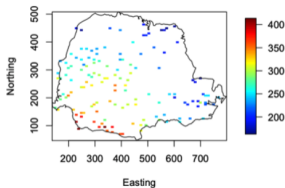
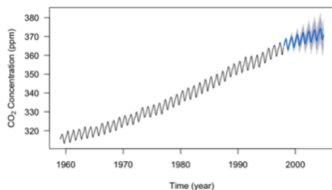


- Introduction to Experimental Design
- Completely Randomized Designs, Block Designs, Nested and Split-Plot Designs
- Random and Mixed Effects Models

Part II: Experimental Design (Week 8 - Week 12)



- Introduction to Experimental Design
- Completely Randomized Designs, Block Designs, Nested and Split-Plot Designs
- Random and Mixed Effects Models
- Computer Experiments



- Stationary Processes, Autocovariance Function
- Autoregressive Integrated Moving Average (ARIMA) Models and Seasonal Models
- Stationarity and Isotropy, Covariance Function
- Gaussian Process Spatial Interpolation (aka Kriging)