Design and Analysis of Experiments
00 - Course Intro

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"*The combination of some data and an aching desire for an answer does not ensure that a reasonable answer can be extracted from a given body of data.*"

John W. Tukey (1915 – 2000)
American mathematician

- To develop advanced skills in designing experiments, defining and testing hypotheses, and performing statistical data analyses within one's field of interest;

- By the end of this course, the student should be able to:
  - Plan experiments related to his/her work;
  - Perform appropriate statistical analyses of the data obtained from the experiment;
  - Develop sound conclusions based on the available data;
  - Identify the problems and limitations of his/her own experiments, and suggest improvements;
  - Perform critical interpretations of other experimental methodologies and results reported in the literature.

- Lectures: discussions about several aspects and techniques for design and analyses of experiments. Theory and application examples;

- Computational case studies;

- Final project presentations;

- Written exam;

- Tutoring;

Course Overview
Course Structure

Evaluation criteria

Item	**Type**	Value
Case studies	Classroom activity	35
Written exam	Written exam	30
Final Project	Report and presentation	35

Other relevant Information

- Lectures slides, example R files, data, etc. available at
  http://git.io/v3Kh8

- Office hours: depends on the week. Please drop me a message
  to check availability.

- Software/services used: R (http://cran.r-project.org/),
  GitHub (http://github.com/).

Main:

- Felipe Campelo (2015), *Lecture Notes on Design and Analysis of Experiments*. Online: http://git.io/v3Kh8 Version 2.11; Creative Commons BY-NC-SA 4.0.
- D.C. Montgomery, G.C. Runger (2010), *Applied Statistics and Probability for Engineers*, John Wiley & Sons.
- Michael J. Crawley (2007), *The R Book*, Wiley.

Additional:

- D.C. Montgomery (2012), *Design and Analysis of Experiments*, John Wiley & Sons.
- B. Caffo (2015), *Statistical inference for data science*, LeanPub - https://leanpub.com/LittleInferenceBook/
- J.J. Faraway (2002), *Practical Regression and Anova using R* - http://goo.gl/ewMWL
- D. Wiens (2005), *Introduction to Design and Analysis of Experiments* - http://goo.gl/hZXg1

This is a course on *applied* experimental design and analysis. As such, a large portion of the course is dedicated to case studies in which the student will design experiments, collect (simulated) data, perform inference and report his or her analysis.

It is **strongly reccomended** that the student should complete the free online course *R Programming*[b] **before the end of the second week** of the semester (except if the student is already fluent with R).

It is also **strongly reccomended** that the student should complete the free online course *Reproducible Research*[c] **before the end of the first month** of the semester (except if the student is already fluent with writing reports using R Markdown).

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[b]https://www.coursera.org/course/rprog

[c]https://www.coursera.org/course/repdata

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Please reference this work as:

Felipe Campelo (2015), *Lecture Notes on Design and Analysis of Experiments*.
Online: `https://github.com/fcampelo/Design-and-Analysis-of-Experiments`
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```
@Misc{Campelo2015-00,
  title={Lecture Notes on Design and Analysis of Experiments},
  author={Felipe Campelo},
  howPublished={\url{https://github.com/fcampelo/Design-and-Analysis-of-Experiments}},
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}
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