

Introduction to the course

Basics statistics for biomedical research

UEB – VHIR & GRBIO

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Contingut

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Who are we?

- This is a **joint** course taught by members of the Grup de Recerca en Bioestadística i Bioinformàtica (GRBIO) (<http://grbio.upc.edu>)



GRBIO

EIO, UPC

GME, UPC

UEB, VHIR

(<http://grbio.upc.edu>)

Grup de Recerca en Bioestadística i Bioinformàtica

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Welcome to the GRBIO website!

Our research group has expertise in **Biostatistics** and **Bioinformatics**, mainly Survival Analysis, Clinical Trials and Biostatistical Methods for Integrative Analysis of Omics Data. Visit our web to see our activities, publications and statistical tools.

[Applications for PhD studies are welcomed.](#)



September 2019



News



Workshop: Statistical and practical aspects of the design, analysis, and conduct of Multi-Arm Multi-Stage (MAMS) Platform Trials Sep 06, 2019

JOB: Novartis Pharma
Jul 19, 2019

PhD in Biostatistics at Erasmus MC in the Netherlands
Jul 12, 2019

Twitter

Tweets by @GRBIO_BCN



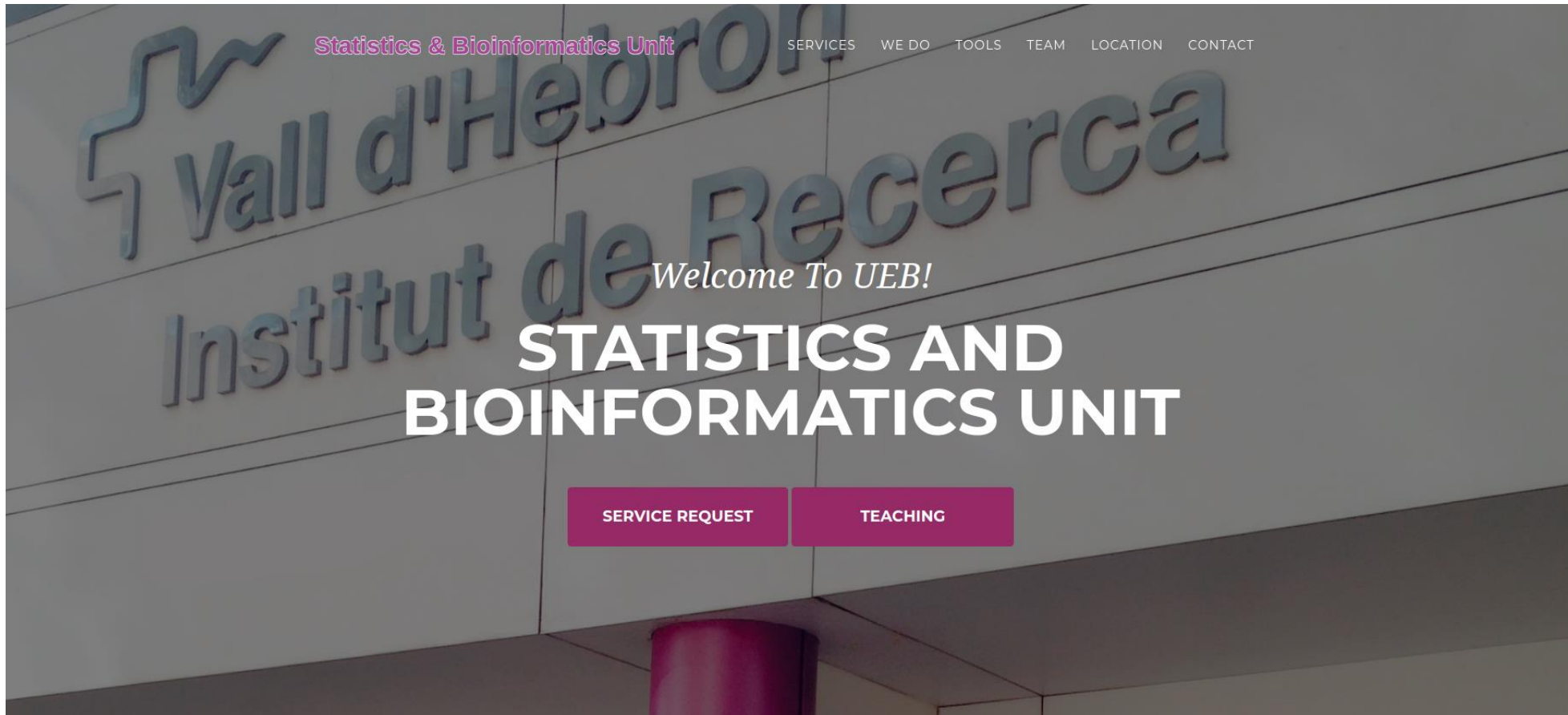
GRBIO Retweeted



Pol Castellano
[@polcastellano_](#)

Food-Biomarker Ontology (FBonto) defines the relationships between foods and metabolites and is already public on the project's Github repository:
github.com/pcastellanoesc...

(<http://ueb.vhir.org>)



Why this course

- A huge quantity of, often complex, data is generated in clinical or lab research.
- In order to be able to extract information from data we must rely on... Statistics!!!
- Statistical methods and tools range from those that are relatively simple and accessible to more complex sophisticated models.

So what?

- The main goal of this course is to provide an overview which is good enough to...
 - Help you to analyze your own data, when it makes sense,
 - Suggests you contact us (or other experts) when it makes sense.
 - Learn when to do either thing :-)

As the master said ...

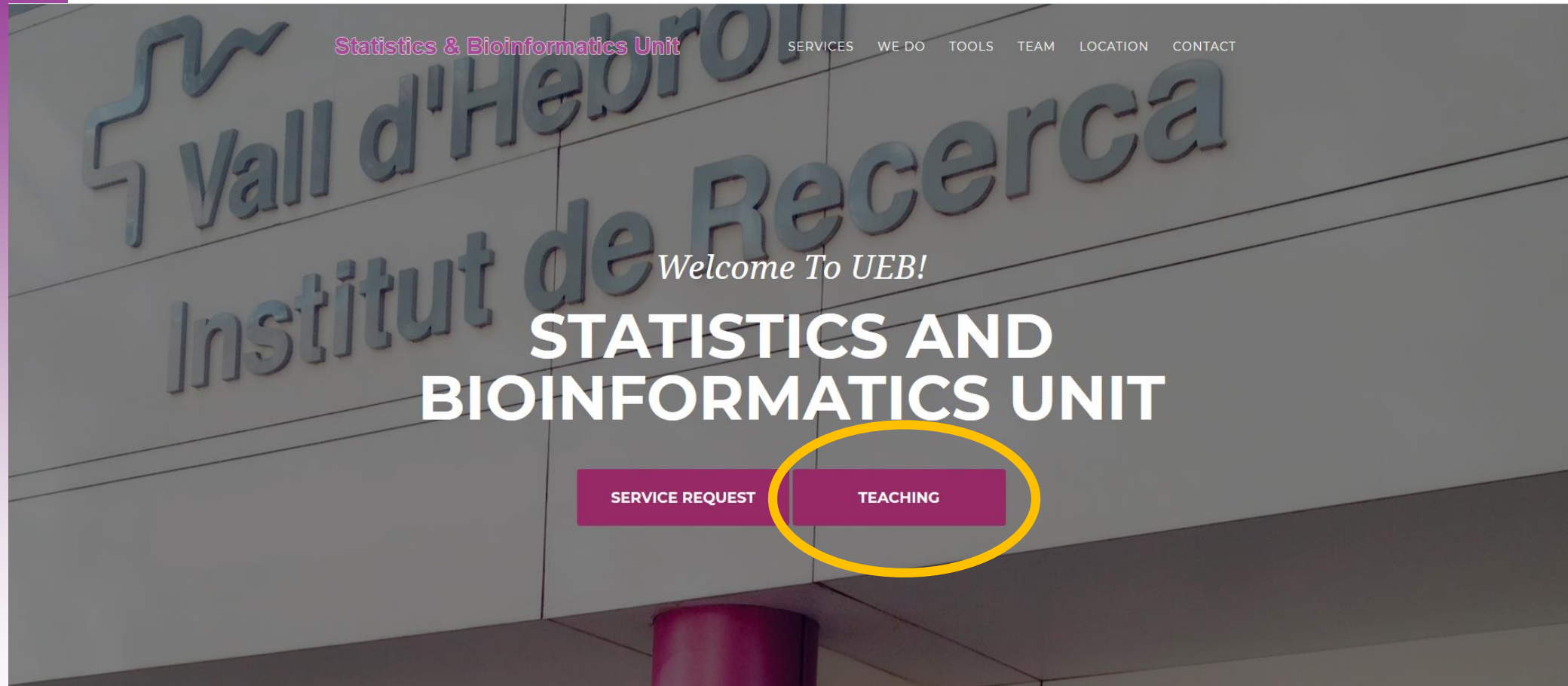
“Hiring a statistician after de data has been collected is like hiring a physician when a patient is in the morgue: she might be able to tell you what went wrong , but she is unlikely to be able to fix it”

R.A. Fisher (*or was it George Box?*)



Objectives

- Main objective of the course is to provide a general overview of the principal statistical methods that can be useful in biomedical research and daily practise
- At the end of the course you should be able to...
 - Recognize the main problems from a statistical point of view.
 - Identify the basic methods to solve these problems.
 - To use basic tools to carry out properly your own analysis.
 - Identify when to apply each method.
 - Be able to ask a professional statistician, using the proper terminology, to understand the solutions when problems increase their complexity,



Statistics and Bioinformatics Unit @ VHIR



Teaching Activities at the UEB

Welcome to the Statistics and Bioinformatics Unit Teaching Activities web site. This page links with the web pages of different courses we are teaching right now or have taught in the past. In these pages you will find all the materials we use for the courses -unless of course they are copyrighted or under some type of confidentiality.

Current Courses (2019)

- **Basic Statistics for Biomedical Research**

Past courses (before 2019)

- **Bioinformatics for clinical and biomedical research**
- **Data Management, Programming and Graphics with R**
- **Advanced Statistics for Biomedical Research**
- *We are progressively incorporating new course materials. If interested in anything specific just contact us : ueb_at_vhir_dot_org*

Materials del curs

Sessió 0 : Presentació del curs

-

Sessió 1 : Introducció a R i R commander

- Presentation

Sessió 2 : Estadística descriptiva I: Resums numèrics, taules i gràfics

- Univariate Descriptive_analysis

Sessió 3: Estadística descriptiva II: Bivariant.

-

Sessió 4: Introducció a la inferència estadística. Intervals de confiança.

-

Sessió 5: Disseny i mida mostral..

-

Sessió 6: Proves d'hipòtesis I: Conceptes bàsics.

-

Sessió 7: Proves d'hipòtesis II: Variables quantitatives.

-

Sessió 8: Proves d'hipòtesis III: Taules de contingència, χ^2

-

Sessió 9: Tests diagnòstics: Sensibilitat, especificitat i corbes ROC.

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Sessió 10: Exercici de anàlisis de dades reals.

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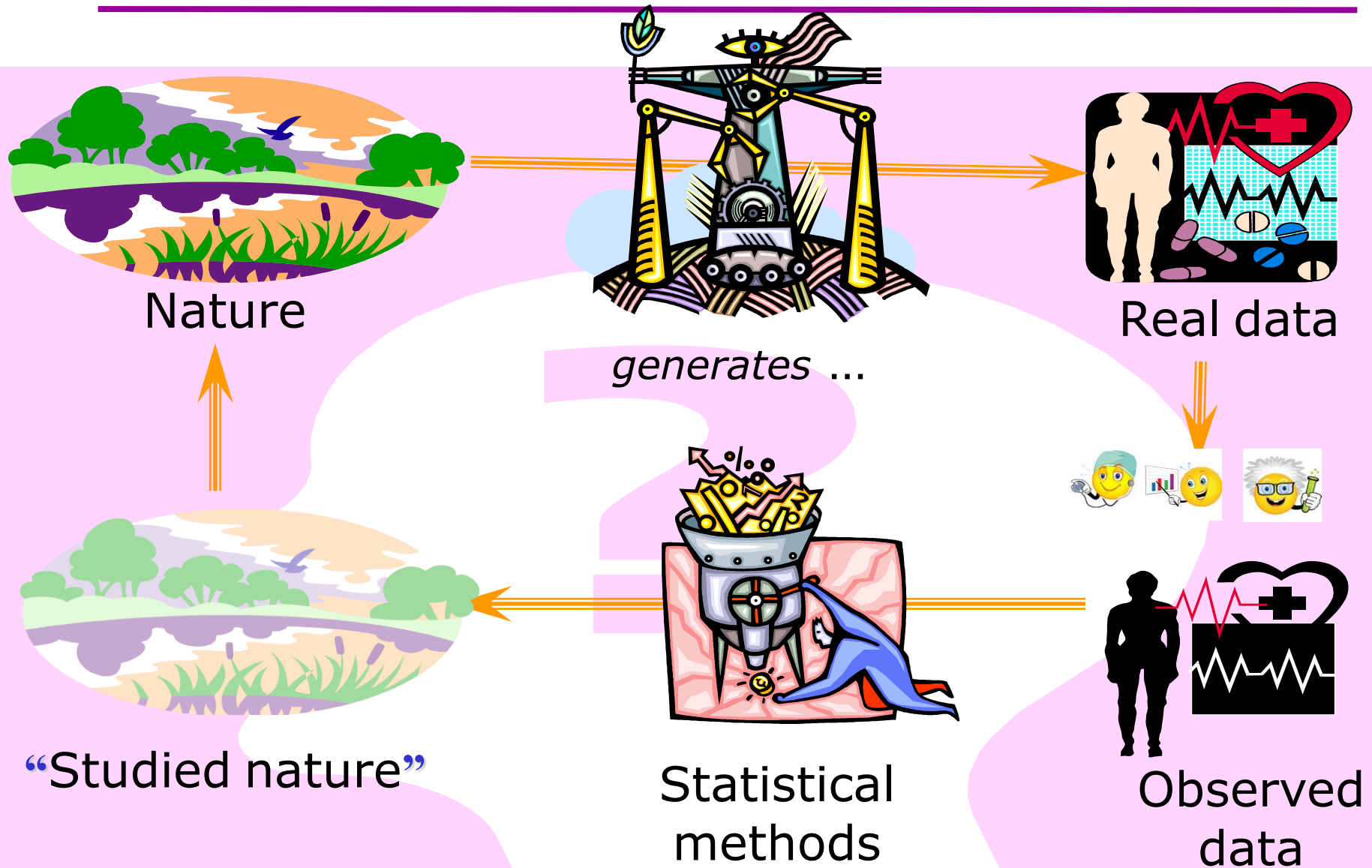
Bases de Dades per exercicis

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Methodology

- This course is about applied statistics
- We work with real data examples
- Data analysis with **R** and **R commander**.
- Theory is important , but discussion of real problems is what leads to understanding.
- Program is flexible and may be adapted to your needs.

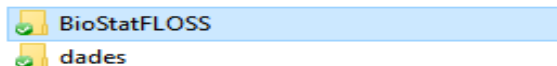
The statistical (scientific?) process



Statistical approaches

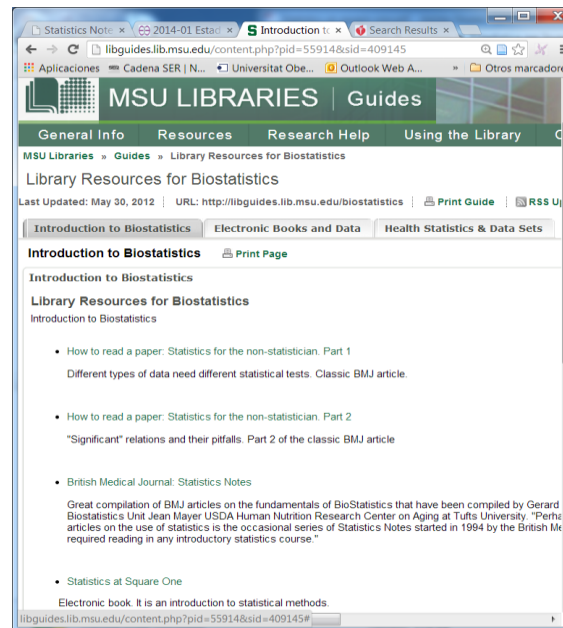
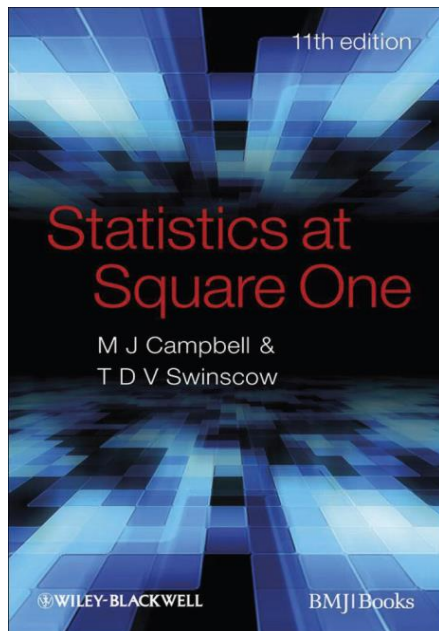
<i>Goal</i>		<i>Statistics</i>
Descript	↔	Estimation <i>Summary measures, Graphics, Confidence Intervals</i>
Compare	↔	Hypothesis testing
Relate or predict	↔	Modelling or Regression

Materials



Resources

- R and R-commander: Free software
- Resources about basic statistics
 - Course slides and exercise *datasets*
 - *Free books and other reference materials*



Biostatistics for
Biomedical Research

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Questions/discussions/topic suggestions:
datamethods.org/t/bbr-video-course
Web course: YouTube channel BBRcourse
R code in text: fharrell.com/code/bbr.zip
Blog: fharrell.com
@f2harrell

Enjoy the course !!!



“Data don’t make any sense,
we will have to resort to statistics.”