

# Welcome

# Welcome!

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- This is **Psychology 2812B**, “Statistics for Psychology II”
- My name is **Paul Gribble**
- I’m a Professor in the Dept. Psychology and also in the Dept. Physiology/Pharmacology
- My research is on neural control of voluntary movement and motor learning in humans — <https://gribblelab.org>
- I don’t hate statistics!
  - I hope after this course neither will you

# Administrivia

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- Lectures are once per week (check [Student Centre](#) for day/time/location)
- Labs are each week (check the OWL site for your section's day/time/location)
- Course resources and weekly schedule are on the course website:
  - <https://gribblelab.org/2812>

# Grades

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- **20% Weekly homework assignments**
  - 10 homeworks are assigned (2% each)
- **40% Midterm Exam**
  - in regular class time (Feb 28)
- **40% Final Exam**
  - date/time/location TBA

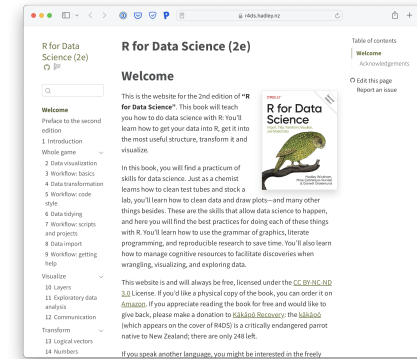
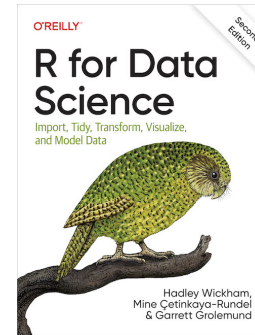
# Textbook

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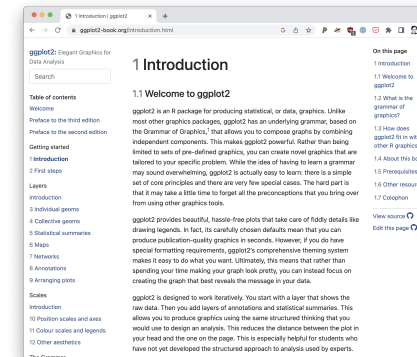
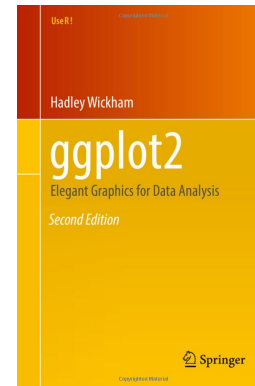
- You do not have to buy a textbook
- We will be using free books and resources on the internet
- Assigned readings will be posted on the course website

# R/RStudio books

- R for Data Science  
by Hadley Wickham & Garrett Grolemund



- ggplot2: Elegant Graphics for Data Analysis  
by Hadley Wickham



# Statistics books

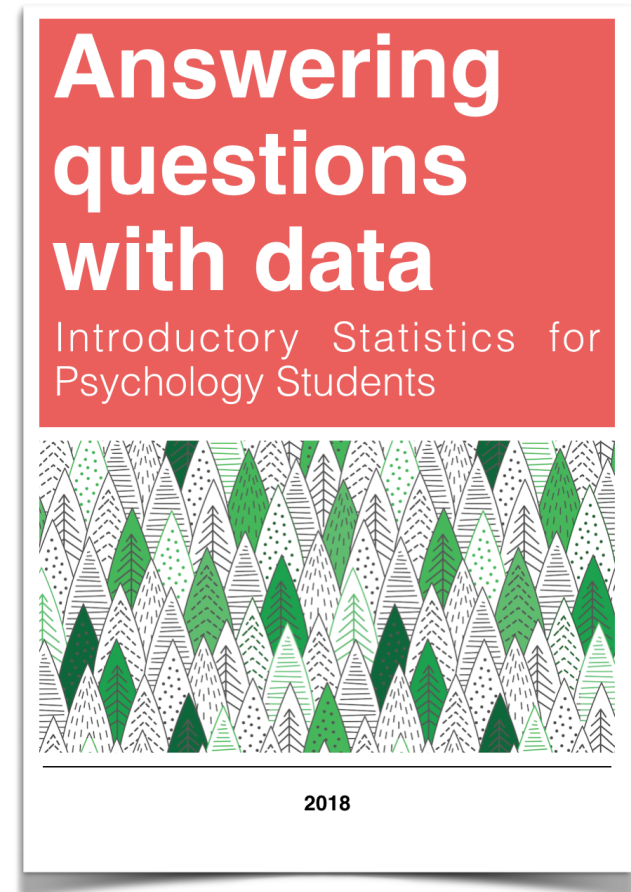
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## Answering questions with data

by Matthew J. C. Crump, Danielle J. Navarro, & Jeffrey Suzuki

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<https://crumplab.com/statistics/>



# Statistics books

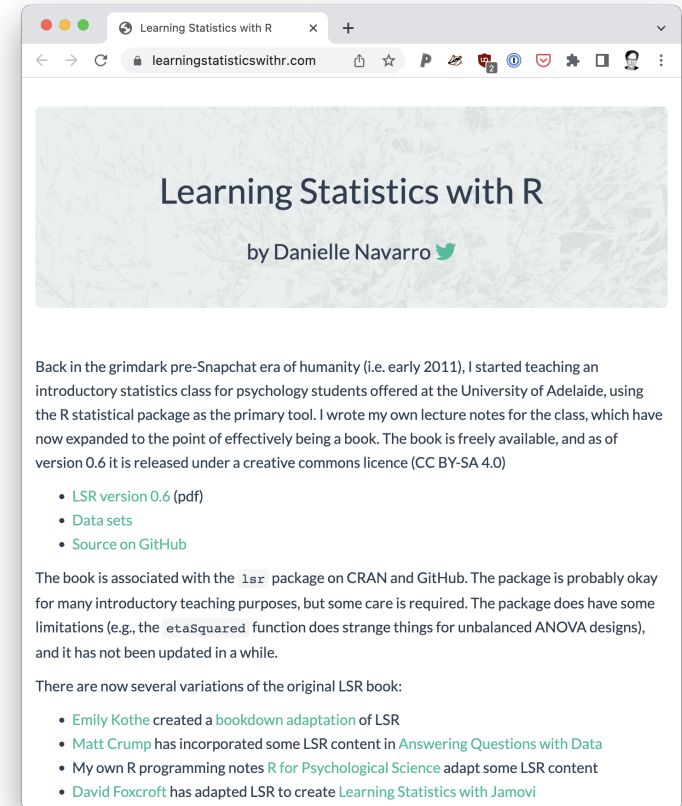
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## Learning Statistics with R

by Danielle Navarro

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<https://learningstatisticswithr.com>





# Laptop

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- You should bring a laptop to lecture
- You should bring a laptop to labs
- You will need to install on your computer:
  1. R
  2. RStudio

# R

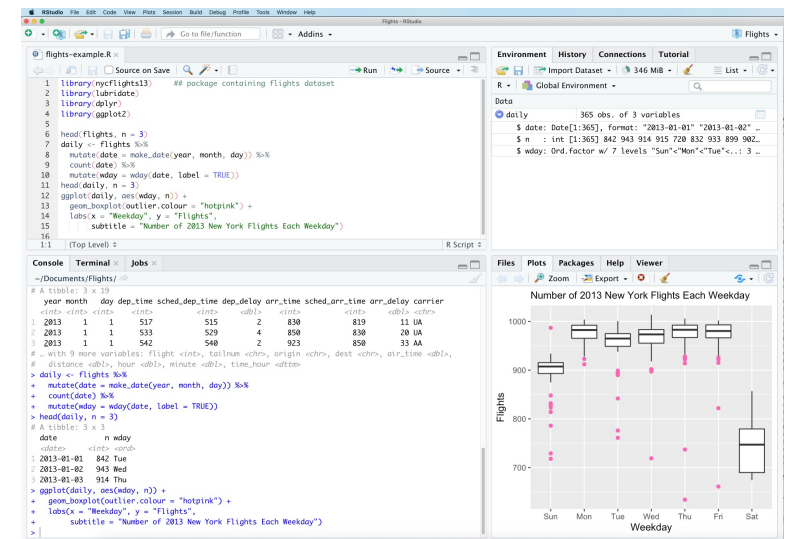
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- <https://www.r-project.org>
  - statistical computing language
  - free & open-source
  - available for macOS, Windows, GNU/Linux
  - download [here](#)



# RStudio

- RStudio
  - integrated development environment (IDE) for R
  - free & open-source
  - available for macOS, Windows, GNU/Linux
  - download [here](#)



# Lectures

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- Lectures are where I present the logic & rationale of the weekly topic
- I may (or may not) show an example in RStudio
- You will get more out of class if you complete the assigned readings before the lecture

# Homework

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- homework assignment is based on weekly topic
- you will write code in RStudio
- what you need to do to be prepared for the homeworks:
  - complete the assigned readings
  - try out the example code in readings
  - attend lectures
  - attend labs

# Late Homework

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- Homework is due at 5:00 pm on Fridays
- A homework solution is posted on the course webpage the following Monday at 12:00 pm
- For each 24-hour period (or portion thereof) that your homework is late until Monday at 12:00 pm, it will incur a penalty of 0.5% (each homework is worth 2%)
- If your homework has not been completed by the time the sample solution is posted (Monday at 12:00 pm), it will receive a score of 0

# Labs

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- Each homework assignment will have two components
  1. **Lab Component** to be done together with the TA in the lab session
  2. **Home Component** to be done on your own
- Both components are to be handed in and graded
- Lab attendance is optional
  - but don't come to the TA or Professor for help on the homework if you chose to skip the lab

# Labs/Homeworks

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- in lecture and in your readings we will focus on the **logic & rationale** of the statistical tests and a high-level overview of how to use RStudio to perform them
- in the labs and homeworks you will learn the hands-on **details** of how to use RStudio to perform the tests & procedures we discuss in class



# Exams

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- some multiple choice
- some short-answer
- mainly organized around:
  - logic and interpretation of data & data visualizations
  - logic, meaning, interpretation and procedures for statistical tests
  - written interpretation of findings
- I won't ask you to generate R code on the exams

# Exams

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- The midterm exam will be in-class during regularly scheduled lecture time
- It will be composed of short answer & multiple choice questions, involving definitions of terms, understanding concepts, and analysing and interpreting data
- I will post sample questions on the course website

# Exams

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- You don't have to memorize equations
- You do have to be familiar with any equations we discuss in class and that are discussed in the mandatory readings
- “familiar with” means knowing how to use the equation to calculate the thing of interest

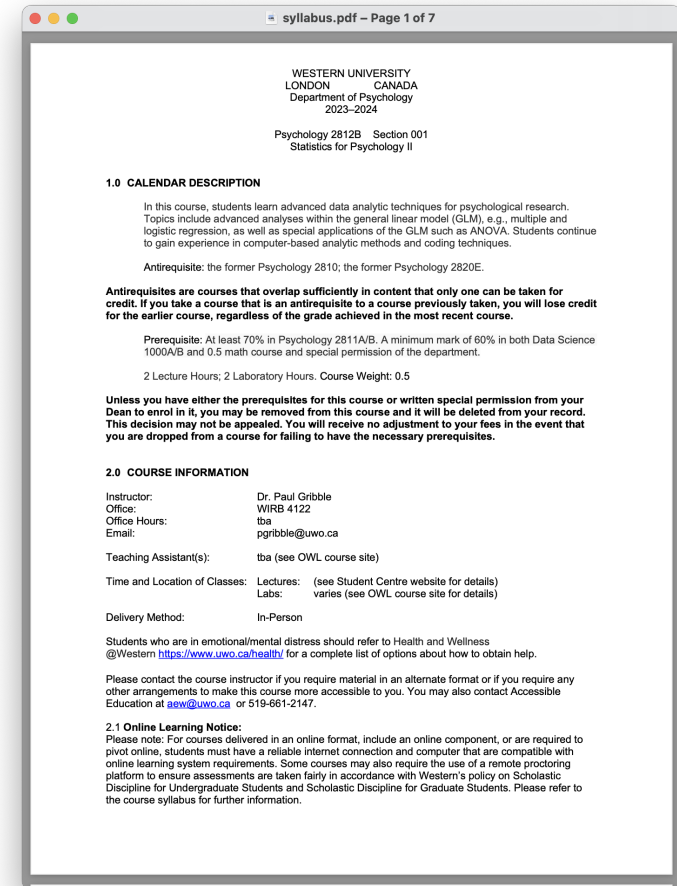
# Exams

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- closed book, no laptop, no calculator
- pencil/pen and paper
- one double-sided “cheat sheet” is permitted, standard letter sized paper (8.5 x 11”)
  - but it must be handwritten not typed

# Syllabus

- Full details about the course policies & procedures can be found in the course syllabus
- syllabus can be found on OWL and on the course website
- read the syllabus



# Course Goals

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- understand the logic & rationale behind statistical tests
- learn some common statistical tests & procedures
  - common thread: **linear models of data**
- learn to use RStudio for:
  - data analysis & visualization
  - statistical tests
  - writing reports

# A Pep Talk

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- statistics has a bad reputation
- courses can be boring, stressful, confusing
- often focused on rote memorization of recipes & procedures
- you end up with little *undertsanding* of the how & why

# Our Goals

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- **lectures**
  - establish an understanding of the rationale and procedure for various statistical tests
- **labs & homework assignments**
  - you will build up your own repertoire of statistical approaches using RStudio
- start simple and build on each subsequent idea
  - requires you to keep up with the course material!



# What is Statistics?

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- statistic is not **math** (it makes use of some math)
- statistics is not **calculation** (calculations are performed)
- statistics is not (just) different ways of describing data
- statistics is a **logical framework** for interpreting data
- statistics helps you answer the question:  
**What do my data mean?**

# What is Statistics?

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- We're not really (usually) interested in our dataset on its own
- We are actually interested in what our dataset says about **how the world works**
- we use **inferential statistics** to make conclusions about how the world works (population) based on our data (sample)

# Elements of a statistical framework

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- fundamentals of probability (previous courses)
- sampling theory (previous courses)
- **Null hypothesis significance testing** (previous courses and this course)
- **Linear models of data** (this course)
- Competency with modern **tools for analysis & visualization** (this course: RStudio)
- Bayesian approaches (future courses)

# Our approach in this course

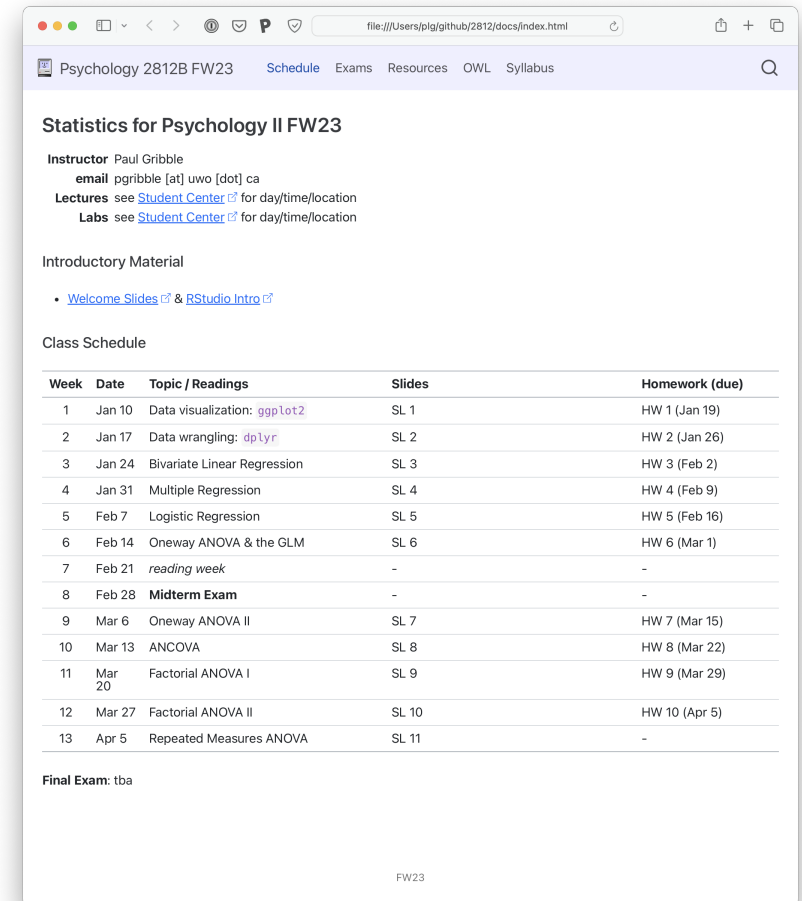
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- **linear models** of data to **describe** phenomena
- **null hypothesis significance testing** for **inferences** about the *world* (population) based on our *data* (sample)
- **RStudio** as a modern tool to do both of the above

# Course Webpage

<https://gribblelab.org/2812>

- assigned readings
- lecture slides
- homework assignments



Psychology 2812B FW23 [Schedule](#) [Exams](#) [Resources](#) [OWL](#) [Syllabus](#)

## Statistics for Psychology II FW23

**Instructor** Paul Gribble  
**email** [pgribble \[at\] uwo \[dot\] ca](mailto:pgribble@uwo.ca)  
**Lectures** see [Student Center](#) for day/time/location  
**Labs** see [Student Center](#) for day/time/location

**Introductory Material**

- [Welcome Slides](#) & [RStudio Intro](#)

**Class Schedule**

Week	Date	Topic / Readings	Slides	Homework (due)
1	Jan 10	Data visualization: <a href="#">ggplot2</a>	SL 1	HW 1 (Jan 19)
2	Jan 17	Data wrangling: <a href="#">dplyr</a>	SL 2	HW 2 (Jan 26)
3	Jan 24	Bivariate Linear Regression	SL 3	HW 3 (Feb 2)
4	Jan 31	Multiple Regression	SL 4	HW 4 (Feb 9)
5	Feb 7	Logistic Regression	SL 5	HW 5 (Feb 16)
6	Feb 14	Oneway ANOVA & the GLM	SL 6	HW 6 (Mar 1)
7	Feb 21	reading week	-	-
8	Feb 28	<b>Midterm Exam</b>	-	-
9	Mar 6	Oneway ANOVA II	SL 7	HW 7 (Mar 15)
10	Mar 13	ANCOVA	SL 8	HW 8 (Mar 22)
11	Mar 20	Factorial ANOVA I	SL 9	HW 9 (Mar 29)
12	Mar 27	Factorial ANOVA II	SL 10	HW 10 (Apr 5)
13	Apr 5	Repeated Measures ANOVA	SL 11	-

**Final Exam:** tba

FW23