Instructor:	Maria Ciarleglio, PhD - maria.ciarleglio@yale.edu
Office Hours	Monday 12:00-1:00 PM Eastern, Virtual. *Beginning 2/8*
Teaching Assistants:	Chang Han - chang.han@yale.edu Lia Lee - lia.lee@yale.edu
Office Hours	Virtual. *Beginning 2/3*. You may attend the office hours of any teaching assistant.

Wednesday 3:00-4:00 PM Eastern (Chang)   Friday 9:00-10:00 AM Eastern (Chang)
Thursday 9:30-10:30 AM Eastern (Lia)   Friday 3:00-4:00 PM Eastern (Lia)

Prerequisite:	EPH 505a or equivalent introductory statistics course. No auditors in Spring, 2021.
Course Website:	https://canvas.yale.edu/

Files: Electronic copies of the syllabus, lecture material and lab material
Assignments: Links to the lab assignments and problem sets, submission location
Zoom: (Password: 06510) Links to lecture, lab, and TA and Instructor office hour Zoom sessions
Media Library: Recordings of the lecture and lab sessions
Announcements: Course announcements

Required Materials:

Textbook
(P&G) Pagano, M. and Gauvreau, K. (2000). *Principles of Biostatistics* (Second Edition). Cengage Learning. ISBN: 978-0534229023. Note: CD not necessary.

The course is divided into 9 topics, or lessons. You are expected to complete the assigned P&G readings prior to the beginning of each lesson.

Course Structure:

Lecture
Monday, 8:00-9:50 AM Eastern, Virtual

Lecture will take place using **Zoom**. Lectures will be recorded and posted in the **Media Library** page on Canvas. Lecture attendance or watching of recorded lectures is expected and you are responsible for any announcements made during lecture. Please also check the **Announcements** page frequently for posted announcements.

Computer Lab
Monday, 1:00-2:00 PM Eastern, Virtual. *Beginning 2/8, see class schedule*

Computer lab will take place using **Zoom**. Labs will be recorded and posted in the **Media Library** page on Canvas. Lab will be led by the course Teaching Assistants. The objective of the lab session is to provide instruction in using **R** to perform data analysis. The labs will also provide you with tools needed to successfully complete the lab assignments and the problem set questions that require you to use statistical software.

R Markdown will be used to create your lab reports. An introduction to **R Markdown** will be given by the TAs in class on 2/1. Please install **R** on your computer before 2/1 or become familiar with the YSPH Window Virtual Desktop (WVD). [YSPH Technology Hub], [YSPH R tutor], [Help from IT at Yale].

Course Goals:

1. Refresh the statistics and probability background needed for the course.
2. Become familiar with a wide range of modern regression methods, including linear regression, logistic regression, Poisson regression, survival analysis, and repeated measures analysis.
3. Achieve competency in carrying out the analyses using **R**.
4. Interpret and communicate statistical results.

Grading: Your final grade will be comprised of the following:

        100%   Homework assignments: Problem sets (PS) and computer lab assignments (LA)

A final average **below 65%** is a failing grade. Cut points for H/HP/P will be determined at the end of the semester based on the distribution of student final averages in the course. Cutoffs between grades are at the sole discretion of the course instructor and **are not known** until all grades have been averaged.

Computer Lab Assignment and Problem Set Instructions:

1. Homework is your only grade in this course. **There are strict rules on homework deadlines and academic integrity that you must follow if you take this course.**
2. All homework (PS and LA) must be submitted online through Canvas (**Assignments** page) by **11:59 PM Eastern on Sundays**. Assignments are due on **Sunday** of the weeks indicated in the **Class Schedule** below.
   a. **Late homework will be accepted until 11:59 PM Eastern on Tuesday.** A 25% penalty will be applied for each day the homework assignment is late.
   b. The following grading rule will be applied to all assignments:

Canvas Recorded Submission Time	Maximum Possible Score
Before 11:59 PM Eastern on Sunday	100%
Between 12:00 AM Eastern and 11:59 PM Eastern on Monday	75%
Between 12:00 AM Eastern and 11:59 PM Eastern on Tuesday	50%
After 12:00 AM Eastern on Wednesday	0%

3. **Your lowest homework assignment grade will be dropped.**
4. **Please do not ask for homework extensions. Please do not ask for waivers of late penalties.**
5. **Problem sets**:
   a. Upload a **PDF** of your solutions. If you hand-write your problem set solutions, you must scan the hard copy and upload the file. Please upload all pages of your submission as **one PDF file**.
   b. Unless indicated, you should NOT use **R** to complete the problem set questions, although you may use **R** or Excel or other similar programs as a calculator to aid you in performing any necessary calculations. **Exception**: You may use **R** to find critical values and p-values. You should fully show your work which means clearly outlining all intermediate steps involved in arriving at your final solution. You must show all work and provide a written conclusion or interpretation for full credit.
6. **Computer lab assignments**:
   a. Complete your lab assignments using **R**. Prepare your lab write up using **R Markdown**.
   b. Perform your analyses in different code chunks within your **R Markdown** document and provide interpretations and responses in the **R Markdown text**. Your **R Markdown** document should **always display your R code along with output or results**. Weave together **narrative text** with **output** to create a logical flow in your write-up. **Unless stated in the question**, you should never include just

code/output as your response to a question. That is, you should always include some text/comment/interpretation, even it's something as simple as stating your finding in a complete sentence. For example, if you are asked to report many rows are in your new data frame, mydata1, your response should include (1) the code that is used to determine the number of rows, (2) the output of the code, and (3) **a complete sentence that uses the output of your code to answer the question** (e.g., "There are xxx observations in the data frame mydata1"). You'll find that inline **R** coding is nice feature of **R Markdown**. When grading, the TAs will grade your text, then make sure your **R** output agrees with your text, and finally make sure the **R** code that generated that output is correct. When no written response is required for a question, this will be clearly stated in the question.

   c. To submit your lab assignment, compile (knit) your final .Rmd file to .html or .pdf. If using html, open the html file in a web browser, and print to PDF. Upload your PDF file to Canvas before the assignment due date.

7. **Neatness counts.** We will not grade what we cannot read and you will receive zero points. Your final answer must be clearly marked.
8. Present the answers to the questions in the order assigned.
9. Put your official name on all submitted assignments (no nicknames).

Academic Integrity Policy: All submitted work must be the sole work of the individual student. You may discuss the course material and the homework questions with your fellow students, but your submitted solutions need to be written up **independently** (i.e., on your own) and **in your own words**. Every student should submit a final product that is his/her **own work**. To prevent any problems with plagiarism, you should write up your homework assignments (problem sets and labs) **by yourself**.

To be **clear** on the issue of **academic integrity:**

1. **Do not** copy another student's work. Doing so will result in an immediate grade of ZERO for all students involved. Note that "working together" is not an excuse.
2. **Do not** electronically share material (lab work, code, write-ups).
3. It is **your** responsibility to seek out clarification from the instructor if any of these points is unclear.

Any suspected violations of the rules of academic integrity in this course will be referred to the Committee on Academic and Professional Integrity (CAPI) and cases involving Graduate School students will be brought to the attention of the Dean of the Graduate School.

For details, see:
- http://catalog.yale.edu/ysph/academic-policies/ysph-committee-academic-professional-integrity-capi/
- Academic Integrity: https://gsas.yale.edu/resources-students/conduct-professional-ethics-reporting-misconduct

Intellectual Property

You may not reproduce, distribute, or display (including posting/uploading) course materials, modified copies of course materials, or course recordings in any way. You also may not allow others to do so. Students violating this provision will be subject to disciplinary action under the academic integrity policy.

Class Schedule, Assigned Readings, Assignment Due Dates:

Date	Lesson	Lecture Topic	Readings P&G	Lab Topic	LA Due	PS Due	Assignment Topic
2/1	0	R Markdown		*No Lab*	-	-	
2/8	1	Review: Exploratory/Descriptive Measures	2, 3, 15.3, 17.1-2, 22	1. Review	2/14: LA #0	-	R Review/R Markdown
2/15	2	Review: Concepts for Statistical Inference	7.2-4, 8-11, 14, 15.1	2. Review	2/21: LA #1	-	Review
2/22		*Break Day – No Class*		*No Lab*	-	-	
3/1	3	Analysis of Variance	12	3. ANOVA	-	-	
3/8	4	Simple Linear Regression	18	*No Lab*	3/14: LA #2	3/14: PS #1	ANOVA
3/15		Simple Linear Regression, continued		4. SLR	3/21: LA #3	3/21: PS #2	SLR
3/22	5	Multiple Linear Regression	19	5. MLR	3/28: LA #4	3/28: PS #3	MLR
3/29	6	Logistic Regression	20	*No Lab*	-	-	
4/5		Logistic Regression, continued		6: Logistic	4/11: LA #5	4/11: PS #4	Logistic Regression
4/12	7	Poisson Regression	7.3	7. Poisson	4/18: LA #6	4/18: PS #5	Poisson Regression
4/19	8	Survival Analysis	21	*No Lab*	-	-	
4/26		Survival Analysis, continued		8. Survival	5/2: LA #7	5/2: PS #6	Survival Analysis
5/3	9	Repeated Measures Analysis		9. Rep. Measures	-	-	

P&G = Pagano and Gauvreau textbook

LA = Lab Assignment

PS = Problem Set

Zoom Etiquette:

- Please display your **full name** in **Zoom**
- You are **not** required to **enable your camera** (Link: [The overlooked environmental footprint of increasing Internet use](#)), but please **mute your microphone** when you are not speaking

Zoom Links (Check Canvas Zoom page for any changes):

Password for all Zoom activities: **06510**

- **Lecture** (MON 8:00-9:50 AM Eastern)
  https://yale.zoom.us/j/96865001585?pwd=VkxqOCtCblBiSmRWMEl1SkdXb2x3dz09
  Meeting ID: 968 6500 1585
  International numbers available: https://yale.zoom.us/u/adPBxcsPZe

- **Lab** (MON 1:00-2:00 PM Eastern)
  https://yale.zoom.us/j/93107936287?pwd=eExOYmNmUkp4MC91SnVYdGt2K3REZz09
  Meeting ID: 931 0793 6287
  International numbers available: https://yale.zoom.us/u/ab87OckVK6

- **Instructor Office Hour** (MON <mark>12:00-1:00 PM</mark> Eastern)
  https://yale.zoom.us/j/98878427555?pwd=VDVCZTB5T1JQdFJLVVpSK0lLNk5LQT09
  Meeting ID: 988 7842 7555
  International numbers available: https://yale.zoom.us/u/aWUINzRsw

- **TA Office Hour (Chang)** (WED 3:00-4:00 PM Eastern)
  https://yale.zoom.us/j/98006424668?pwd=UTVFSXZYNnRoL1FOcGF3Mk5DNUF0QT09
  Meeting ID: 980 0642 4668
  International numbers available: https://yale.zoom.us/u/abKY62kd7w

- **TA Office Hour (Lia)** (THUR 9:30-10:30 AM Eastern)
  https://yale.zoom.us/j/97694622178?pwd=TUM0Q0NLdDRtSnJEdE9BQnJPSm5rZz09
  Meeting ID: 976 9462 2178
  International numbers available: https://yale.zoom.us/u/adFLXncuVE

- **TA Office Hour (Chang)** (FRI 9:00-10:00 AM Eastern)
  https://yale.zoom.us/j/93967302847?pwd=clRGOTJEZWo1eUV0RFU4dFFWamhrdz09
  Meeting ID: 939 6730 2847
  International numbers available: https://yale.zoom.us/u/acOtH8zF0k

- **TA Office Hour (Lia)** (FRI 3:00-4:00 PM Eastern)
  https://yale.zoom.us/j/98893326703?pwd=VHJmRyt6eWR6UXM0SWd1TkR4ZlFuZz09
  Meeting ID: 988 9332 6703
  International numbers available: https://yale.zoom.us/u/abMPbb2bqK

- Call-in phone number: 203-432-9666 (2-ZOOM if on-campus) or 646-568-7788
- Have questions about how to use Zoom? Check out the Zoom Help Center at
  https://support.zoom.us/hc/en-us
- For immediate assistance, contact the IT Help Desk at 203-432-9000