# ECON 3818-030
## Introduction to Statistics with Computer Applications

MWF 1:00 - 1:50 pm in HLMS 267
Spring 2020

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| **Instructor:** | Solveig Delabroye | **Office Hours:** | W & F 2 – 3 & by appt. |
| **Email:** | solveig.delabroye@colorado.edu | **Office:** | ECON 414 |
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| **TA:** | Cameron Duff | **Office Hours:** | Wed 10 – 12 and by appt. |
| **Email:** | cameron.duff@colorado.edu | **Office:** | ECON 401 |
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| **Recitation 031** | Mon 4:004:50 in DUAN G2B21 | | |
| **Recitation 032:** | Wed 5:005:50 in ECON 119 | | |

## Course Information

**Course Website:** https://canvas.colorado.edu/

**Required Ebook and homework package:** Sapling Plus for *The Basic Practice of Statistics* by David S. Moore, William I. Notz, and Michael A. Fligner, 8th ed., 2018 (***access through Canvas***, 14-day free trial, then $ 90.99. Course ID 114178).

**iClicker for extra credit** An iClicker remote or a registration to iClicker Reef to use with a smartphone or computer app (https://www.iclicker.com/pricing, 14-day free trial, then $14.99 for 6-month access).

**Course Description:** From satellites continuously orbiting the globe to social network like Facebook or LinkedIn, from polling organizations to United Nations observers, data are being collected everywhere and all the time. Knowledge in statistics provides you with the necessary tools and conceptual foundations in quantitative reasoning to extract information intelligently from this sea of data.
It is extremely useful for your future life and career, as you will need to be able to make good use of massive amounts of information to make sound decisions, whether it be in economics or in a different field. For your academic career, this class will be essential when moving on to econometrics, the data-driven side of economics.

**Computer Application: R** is an open-source programming language available on to install Mac, Windows, and Unix operating systems (not on Chrome OS), as well as on browser-based platforms. It is pre-installed on most University computer labs and downloadable from https://cran.rstudio.com/ . Every other week or so we will spend time in class to work on **R** exercises through the **RStudio desktop** interface (https://www.rstudio.com/products/rstudio/download/). If you can't/don't want to install anything, you can also create a free account on https://rstudio.cloud/ and run everything from your Internet browser.

# Course Policies

## General policies

- If you don't attend at least 3 lectures out of the first 5, you will be administratively dropped on Wednesday, Sept. 4th so that students who are still on the waitlist can be added.

- **There will be no make-up exams**. If you miss an exam without justification, you will get a 0. In case of documented medical or family emergency, the weight of a missed midterm will be added to the final exam, and a missed final will lead to an Incomplete (I) grade.

- **Final exam Mon May 4$^{\text{th}}$ 4:30 p.m. 7:00 p.m.** The final is cumulative. Students who have **three or more final exams** on the same day are entitled to <u>reschedule</u> the last one(s). You have to notify me by **by April 3rd**.

- If you are caught cheating in any fashion (on exams or homework) you will be given an $F$ for the semester and your case will be reported to the Honor Code Council for review.

- Computers, tablets and smartphones can be useful tools for learning, but they can also generate temptation and distraction. Know yourself and try to notice how it works for you. Use of electronics is allowed in lecture, but you'll be asked to leave if it is distracting to others.

- **Prerequisites:** ECON 2010, ECON 2020, and either ECON 1088 or MATH 1081 or MATH 1300 or MATH 1310 or APPM 1350 (all minimum grade C-). This class uses <u>algebra and calculus</u> so exposure to these concepts is <u>required</u>.

- Students who qualify for an accommodation on exams have the responsibility to inform me **at least two weeks before** an exam.

## Grades

- **Break-down:** Below is the weight given to each of the assignments you are expected to complete. Their are 2 options for the weight of the exams. I will automatically apply whichever option is most advantageous for you.

| Recitation | 10% | **Option 1** | | **Option 2** | |
|---|---|---|---|---|---|
| Sapling Homework | 10% | Midterm 1 | 20% | best of Midterm 1 and Midterm 2 | 30% |
| **R** Exercises | 10% | Midterm 2 | 20% | Final Exam | 40% |
| Extra Credit (iClickers) | 5% | Final Exam | 30% | | |

- **Reporting:** Grades will be uploaded to Canvas as soon as assignments are graded.

- **Curving:** Each midterm will be curved if the class average is below 72, and a curve *may* be applied to the overall course grade to get to an average of at least C+ (79). After curving, I will automatically round final course grades to the nearest full percent (a 79.49% is a 79, i.e. a C+, but a 79.50% or above is a 80, i.e. B-).

- **Grade Adjustments:** *I will not grant any request to increase your grade to meet a certain cutoff.* You will receive the grade that you earned throughout the course. *If you are concerned about your grade(s) or encounter issues* that impact your performance you should *immediately come talk to me*. I will do everything I can to help you be successful in this course.

- **Grading Scale:**

| Grade | Percentage | Grade | Percentage |
|-------|------------|-------|------------|
| A | $93 \leq x$ | C | $73 \leq x < 77$ |
| A- | $90 \leq x < 93$ | C- | $70 \leq x < 73$ |
| B+ | $87 \leq x < 90$ | D+ | $67 \leq x < 70$ |
| B | $83 \leq x < 87$ | D | $63 \leq x < 67$ |
| B- | $80 \leq x < 83$ | D- | $60 \leq x < 63$ |
| C+ | $77 \leq x < 80$ | F | $x < 60$ |

## Assignments:

- **Homework:** Weekly homework assignments are on the Sapling website (access through Canvas). They will be due by 11:59 pm most Sundays. Your lowest homework grade will be dropped.

- **Recitation:** Recitation attendance is mandatory. Not only will your grade in recitation account for 10% of your final grade in the course, but there will be material provided in recitation that is crucial for success in the course. Recitation grades are determined by take-home exercises and attendance. Refer to the recitation syllabus for details. **There is no recitation the first week of the semester**. To know which recitation you are registered in (31 or 32) check `buffportal.colorado.edu`.

- **R Exercises:** There will be five simple assignments for you to complete in **R** and one data project. We will work on each one in class the week before the assignment is due (bring your laptop!). The data project will give you hands-on experience cultivating and analyzing a data set of your choice. The first exercise will not be graded. The remaining 4 exercises and data project are each 2% of your final grade. All **R** exercises will be submitted through Canvas.

- **Exams:** There will be 2 midterms and a final, all predominately multiple choice with one or two free response questions. Partial credit will be awarded wherever possible. I will provide the necessary formulas during the exam Any tables required will be provided. You will only be allowed the use of a basic calculator during exams (graphing calculators and **R** are not allowed on exams).

- **Extra Credit:** The only extra credit opportunity will be through iClickers. There will be roughly 1-2 clicker questions per lecture. A maximum of five percentage points will be added to your grade for excellent clicker participation. If you're using a remote and not Reef, make sure to register your iClicker. See instructions at:
`https://oit.colorado.edu/tutorial/cuclickers-iclicker-remote-registration`

## Tentative Schedule

| Week | Dates | Content |
|------|-------|---------|
| 1 | Jan 13-17 | • Topics: Syllabus, What is Statistics, Variables and Distributions<br>• Chapters: 1<br>• Due: Homework Chapter 1, Sun Jan 19 |
| 2 | Jan 20-24 | • **No class MLK Day, Jan 20**<br>• Topics: Mean and Variance, Introduction to **R**<br>• Chapters: 2<br>• Due: Homework Chapter 2, Sun Jan 26 |
| 3 | Jan 27-31 | • Topics: What is Probability, Random Variables, Probability Rules<br>• Chapters: 12, 13<br>• Due: **R assignment 1, Wed**; Homework chap 12, Sun Feb 2 midnight. |
| 4 | Feb 3-7 | • Topics: the Binomial Distribution, Probability Distributions<br>• Chapters: 14, Probability Distributions Handout<br>• Due: Homework chap 13 & 14, Sun Feb 9 midnight. |
| 5 | Feb 10-14 | • Topics: The Normal Distribution, Data Generation, **R**-day 2 on Fri<br>• Chapters: Chap 3<br>• Due: Homework chap 3 & 8, Sun Feb 16 midnight. |
| 6 | Feb 17-21 | • Topics: Mathematical Expectations, **Midterm 1**<br>• Chapters: Expectations Handout<br>• **R assignment 2, Wed**;<br>  **Midterm 1, Fri Feb 21** |
| 7 | Feb 24-28 | • Topics: Experiments, Sampling Distributions<br>• Chap 9, Chapter 15 part 1<br>• Due: Homework chap 9 Sun Mar 1 midnight. |
| 8 | Mar 2-6 | • Topics: Estimation, Central Limit Theorem, Convergence<br>• Chapters: Estimation Handout, Chap 15 part 2<br>• Due: Homework chap 15 due Sun Mar 8 midnight. |
| 9 | Mar 9-13 | • Topics: Confidence Intervals, Hypothesis Testing<br>• Chapters: 16, 17<br>• Due: Homework chap 16 & 17, Sun Mar 15 midnight. |
| 10 | Mar 16-20 | • Topics: **R**-day 3 on Mon, $p$-values, Size, Power, Inference<br>• Chapters: 18<br>• Due: **R assignment 3, Wed**; Homework chap 18, Sun Mar 22 midnight |
|  | Mar 23-29 | • **Spring break, no class.** |
| 11 | Mar 30 - Apr 3 | • Topics: **R**-day 4 on Mon, $t$-distribution, Single Sample Uses of $t$-distribution<br>• Chapters: 20<br>• Due: **R assignment 4, Fri**; Homework Chap 20 Sun Apr 5 midnight |
| 12 | Apr 6-10 | • Topics: Two Sample Uses of $t$-distribution, **Midterm 2**<br>• Chapters: 21<br>• Due: **Homework Chap 21 Wed** midnight, **Midterm 2, Fri Apr 10** |

| 13 | Apr 13-17 | • Topics: Covariance & Correlation, **R** Day for **R** Project<br>• Chapters: 4<br>• Due: Homework chap 4, Sun Apr 19 midnight |
|----|-----------|------------------------------------------------------------------------------------------------------------------------------|
| 14 | Apr 20-24 | • Topics: Intro to Regression, **R** Day 5 on Wed, Least Squares<br>• Chapters: 5, 6<br>• Due: **R Project Fri Apr 24**; Homework chap 5, Sun Apr 26 midnight |
| 15 | Apr 27-31 | • Topics: Least Squares, Review<br>• Chapters: 6<br>• Due: **R day 5 Fri Apr 31**<br>• Reading day Fri, Apr 31: no classes. |
|    | Finals week | • **Final Exam: Mon, May 4th 4:30pm – 7:00pm in HLMS 267** |

# University Policies

- **DISABILITY POLICY:** I am committed to providing everyone the support and services needed to participate in this course. If you qualify for accommodations because of a disability, please give me a letter from Disability Services in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities. Contact Disability Services at 303-492-8671 or by e-mail at dsinfo@colorado.edu.

- **HONOR CODE:** Students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. Incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from myself and non-academic sanctions (including but not limited to university probation, suspension, or expulsion).

- **RELIGIOUS OBSERVATION POLICY:** Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments, or required attendance. If you have a conflict, please make arrangements with me no later than the first week of the semester.

- **CODE OF BEHAVIOR POLICY:** Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty has the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which we express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance and nationalities.

- **DISCRIMINATION AND HARASSMENT POLICY:** CU Boulders policy on Discrimination and Harassment can be at www.colorado.edu/oiec/policies/discrimination-harassment. The policy on Sexual Harassment and on Amorous Relationships applies to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus discrimination and harassment resources can be obtained at http://www.colorado.edu/odh.