# ECON 3818-020
## Intro to Statistics with Computer Applications

Fall 2018

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| **Instructor:** | Brach Champion | **Time:** | MWF 1:00pm – 1:50pm |
| **Email:** | brachel.champion@colorado.edu | **Room:** | GUGG 205 |
| **Office Hours:** | MWF 2:00pm – 3:00pm | **Office:** | ECON 304 |

## 1 Course Information

**Course Websites:** https://learn.colorado.edu/, http://www.saplinglearning.com/ibiscms/

**Required Textbook:** David S. Moore, William I. Notz, and Michael A. Fligner, *The Basic Practice of Statistics*, W. H. Freeman, 8th ed., 2017.

**Recommended Supplemental Textbooks:**

- Alan Caniglia, *Statistics for Economics: An Intuitive Approach*, Harper Collins, 1992.
- Dennis Wackerly, William Mendenhall, and Richard L. Scheaffer, *Mathematical Statistics with Applications*, Thomson Brooks/Cole, 7th ed., 2008.

**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-).

**Course Description:** Statistical literacy is one of the most valuable skills you can learn at University. This course will give you the theoretical foundation to study and understand statistics with the ultimate goal to prepare you for econometrics. We will start talking about types of data, probability rules and distributions, and sampling methods before midterm one. Midterm two will focus on inference from a sample including sampling distributions, estimation, confidence intervals and hypothesis testing. Before the cumulative final we will briefly discuss the basics of regression analysis.

**Computer Application:** **R** is a free programming language available on Mac, Windows, and Unix operating systems. It is pre-installed on most University computer labs and downloadable from the internet. Every other week or so we will spend time in class to work on **R** exercises through the **RStudio** interface. We will do a brief introduction in class on 8/31, but you are responsible for knowing the language syntax otherwise. Thankfully **R** has fantastic documentation in the base installation.

## 2 Course Policies

### General policies

- *No makeup homework assignments or exams will be given.*

- No late homework assignments will be accepted under any circumstances.
- It is the student's responsibility to inform me of any accommodations two weeks before an exam.
- Please allow 24 hours for me to respond to emails. I will not discuss grades over email per FERPA guidelines.
- You will only be allowed the use of a basic statistical calculator during an exam (graphing calculators and **R** are not allowed on exams).

## Grades

- **Distribution:** Below is the weight given to each of the assignments you are expected to complete:

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| Recitation | 10% | Midterm 1 | 20% |
| Sapling Homework | 10% | Midterm 2 | 20% |
| **R** Exercises | 10% | Final Exam | 30% |
| | | Extra Credit | 5% |

- **Reporting:** Grades will be uploaded to D2L as assignments are graded.
- **Curving:** Midterms *may* be curved individually, and a curve *may* be applied to the overall course grade to conform to departmental standards. I will automatically increase final course grades that are 0.5% below any grade cutoff after any final grading curve has been applied.
- **Letter Grade Cutoffs:** Below is the letter grade you will receive for the final score given in the class:

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| $\geqslant 93$ | A | 87-89.9 | B+ | 77-79.9 | C+ | 67-69.9 | D+ | $\leqslant 59.9$ | F |
| 90-92.9 | A- | 83-86.9 | B | 73-76.9 | C | 63-66.9 | D | | |
| | | 80-82.9 | B- | 70-72.9 | C- | 60-62.9 | D- | | |

- **Grade Adjustments:** Other than the 0.5% bump discussed above, *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) you should immediately come talk to me. I will do everything I can to help you be successful in this course.

## Assignments

- **Sapling Homework:** There will be a brief problem set assignment every week. It will be due on Friday at 5pm. Visit http://www.saplinglearning.com/ibiscms/ and use code champion to access this section's assignments. You are responsible for knowing when homework is due. Late homework will not be accepted. Your two lowest homework grades will be dropped.

- **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. 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.
- **Recitation:** This is a four credit course. Recitation attendance is mandatory. Your TA is responsible for your recitation grade. The TA for recitation is PhD student Kevin Starnes. There is no recitation the first week of the semester. You are responsible for attending the correct recitation.
- **Extra Credit:** The *only* extra credit opportunity is through iClicker questions during lecture. A maximum of five percentage points will be added to your grade for excellent clicker participation. You must register your iClicker to receive credit. http://www.colorado.edu/oit/tutorial/cuclickers-iclicker-remote-registration

### Exams

- **Midterms:** Midterms will be predominately multiple choice with one or two free response questions. You are allowed a 3x5" index card of hand written notes for reference during the exam. You will also be allowed to bring any tables of values relevant to the topic(s) being tested.
- **Final Exam:** The final exam is cumulative. The exam is **Monday, December 17 from 1:30pm – 4:00pm**. This date is non-negotiable.
- Partial credit will be awarded wherever possible on all exams.

### Cheating

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.

## 3 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 submit to your instructor 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 or race, culture, religion, politics, sexual orientation, gender variance and nationalities.
- **DISCRIMINATION AND HARASSMENT POLICY:** CU Boulder's policy on Discrimination and Harassment can be found on the university website. 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.

# 4 Tentative Schedule

| Week | Dates | Content |
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| 1 | Aug 27-31 | • Topics: Administration, Population vs. Sample, Introduction to **R**<br>• Chapters: 1, 2<br>• Due: Homework 1, Sun at 11:59pm |
| 2 | Sep 3-7 | • Topics: What is Probability, Random Variables, Probability Rules<br>• Chapters: 12, 13<br>• Due: **R assignment 1, Wed beginning of class**; Homework 2, Sun at 11:59pm<br>• **No class Labor Day, Sep 3** |
| 3 | Sep 10-14 | • Topics: Binomial Distribution, Normal Distribution<br>• Chapters: 14, 3<br>• Due: Homework 3, Sun at 11:59pm |
| 4 | Sep 17-21 | • Topics: Mathematical Expectations, Variance, Data Generation<br>• Chapters: Expectations Handout, 8, 9<br>• Due: **R assignment 2, Wed beginning of class**; Homework 4, Sun at 11:59pm |
| 5 | Sep 24-28 | • Topics: Sampling Distributions, Review, **Midterm 1**<br>• Chapters: 15<br>• **Midterm 1, Fri** |
| 6 | Oct 1-5 | • Topics: Estimation, Central Limit Theorem, Convergence<br>• Chapters: 15<br>• Due: Homework 5 due Sun at 11:59pm |

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| 7 | Oct 8-12 | • Topics: Confidence Intervals, Intro to Hypothesis Testing<br>• Chapters: 16, 17<br>• Due: Homework 6 due Sun at 11:59pm |
| 8 | Oct 15-19 | • Topics: $p$-values, Size, Power, Inference<br>• Chapters: 17, 18<br>• Due: **R assignment 3, Wed beginning of class**; Homework 7, Sun at 11:59pm |
| 9 | Oct 22-26 | • Topics: $t$-distribution, Single Sample Uses of $t$-distribution<br>• Chapters: 20<br>• Due: Homework 8, Sun at 11:59pm |
| 10 | Oct 29-Nov 2 | • Topics: Two Sample Uses of $t$-distribution, **Midterm 2**<br>• Chapters: 20, 21<br>• Due: **Midterm 2, Fri** |
| 11 | Nov 5-9 | • Topics: Tests of Proportions, Covariance & Correlation<br>• Chapters: 22, 23, 4<br>• Due: **R assignment 4, Wed beginning of class**; Homework 9, Sun at 11:59pm |
| 12 | Nov 12-16 | • Topics: Intro to Regression, **R** Project<br>• Chapters: 4, 5<br>• Due: Homework 10, Sun at 11:59pm |
| | Nov 19-23 | • **Thanksgiving break, no class.** |
| 13 | Nov 26-30 | • Topics: Least Squares, $\chi^2$-distribution<br>• Chapters: 6, 25<br>• Due: **R Project Fri at 5pm**; Homework 11, Sun at 11:59pm |
| 14 | Dec 3-7 | • Topics: Conditions, Estimation, and Hypothesis Testing in Regression<br>• Chapters: 26<br>• Due: Homework 12, Sun at 11:59pm |
| 15 | Dec 10-13 | • Topics: Categorical & Interaction Models, ANOVA, Causal Inference<br>• Chapters: 27, 29<br>• Due: **R assignment 5, Wed beginning of class**; Homework 13, Sun at 11:59pm |
| | Dec 17 | • **Final Exam: Mon, Dec 17 1:30pm – 4:00pm** |