MATH 2830 - Sec 008: Introductory Statistics Spring 2018

Instructor: Dr. RaKissa Manzanares Office: SCB-4110 Phone: 303-315-1717 E-mail:rakissa.manzanares@ucdenver.edu **Course dates/times:** M/W 12:30-1:45pm **Course Location:** SCB 4125 **Office Hours:** M/W 11:00-12:00 or by appt.

Dept. Associate Chair: Stephen Billups – Office SCB-4221, Phone: 303-315-1735 **Course Captain:** RaKissa Manzanares – SCB-4110; Phone: 303-315-1717

Description

This is a mathematics course that was designed to fulfill the CORE University requirements. This course is an introduction to statistical terminology and techniques. Topics include graphical representations of data sets, sampling techniques, measures of center and spread, basic probability, one sample and two sample hypothesis testing and regression.

Course Overview

This course is an introduction into descriptive and inferential statistics and provides important background for further study in statistics. This course provides opportunities for the student to design and implement their own statistical research and become a more critical consumer of statistical information and processes.

Prerequisites

- A demonstrable understanding of intermediate algebra
- Familiarity with computers and a spreadsheet program (Excel is preferred)

Highly Recommended Materials

Calculator: TI-83 Plus OR TI-84

Required Material

Text: <u>Elementary Statistics: A Step by Step Approach</u>, 10th Edition, Alan Bluman, McGraw Hill, 2017.

Note: The Tivoli bookstore has these options:

- ✓ ISBN 9781260219081 (\$187.50). Loose-leaf edition of the text plus ConnectMath access, including the e-book.
- ✓ ISBN 9781260041774 (\$122.50). ConnectMath access, including the e-book.

If you buy the text new from the bookstore it will be bundled with ConnectMath access. There will be no used textbook available for this course since this is a brand new edition of the book. The most economical way to purchase the textbook and ConnectMath is to go directly to <u>www.connectmath.com</u> and purchase it for \$104.00, which includes the e-book. If you are comfortable using the electronic version of the text, then you do *not* need to purchase the textbook.

The course ID is: YHQXY-G4FXF

Expectations

This course, as any course in statistics, requires a solid knowledge of terminology as well as techniques. As such, students should expect to spend some time outside of class reading the textbook and mastering the terminology. This is in addition to written assignments and is vital for success in the class. **Rule of thumb**: plan to spend two to three hours outside of class (reviewing your lecture notes, reading the text, and working problems) for every hour spent in class. It is important that you seek help from your instructor or your colleagues if you get stuck. I encourage you to form study groups. If you have homework questions that are not answered in class, it is your responsibility to get help outside of class from me or one of your colleagues.

Attendance

Attendance will be taken daily. You are expected to attend class faithfully and to take responsibility for your own learning. Each student is allowed to miss up to 3 class periods over the course of the semester. If you chose to miss more than the allotted 3, you will lose the opportunity to improve prior exam grades on the final exam. NOTE: If you know ahead of time that you will have to miss a class you should contact me immediately to get the homework, any class handouts, etc. It is not my responsibility to make sure you don't miss deadlines or assignments...it is your responsibility!

"A genius is a talented person who does his homework." ~Thomas Edison

Methods of Evaluation

Homework

Homework problems will be assigned weekly from the online homework program ConnectMath. These assignments will be graded and are worth a total of 100 points. The lowest 3 assignments will be dropped at the end of the semester. You will use ConnectMath to do the online homework. You get immediate feedback while doing the online homework since the problems are graded as you do them. Additionally, if you want to improve your score on a particular assignment you can return and retry that assignment before its due date. If you do not do an online homework by its due date you will receive a zero on that homework.

Quizzes

There will be 11 homework quizzes (mostly in class but some will be take home) over the course of the semester worth 20 points each. Each quiz will be over the prior week's homework and will be given every Wednesday except during exam weeks (e.g. homework assigned in week 1 will be covered in the quiz on Wednesday of week 2. To compensate for unforeseen circumstances, one-quiz score will be dropped. **No make up quizzes will be given**. You must contact me in **advance** to arrange another time to take the quiz (prior to the scheduled in class quiz). In class quizzes will be given at the beginning of the class. Do not be late!

Exams

There will be 3 in class exams worth 100 points each – see tentative schedule for dates. **There will be no make up exams.** You must contact me in **advance** so that we may arrange another test date (prior to the scheduled in class exam): documentation **will** be requested. You must bring your student ID card and a government issued photo ID to each exam.

Project

There will be one project assigned and collected. The specifics of this project will be discussed when it is assigned. You will have a minimum of two weeks to complete each portion of the project. The project will require individual thought and originality as well as the use of Excel or a similar program. A 20% late penalty will be assigned for each class period it is late.

Final Exam

There will be a comprehensive final exam worth 150 points. Each student who has maintained the attendance policy will have the opportunity to improve prior exam scores on the final exam (to be discussed in detail in class). Attendance at the **SATURDAY** final exam is mandatory. Having the final rescheduled is extremely rare and is not permitted for reasons such as a plane ticket that was purchased earlier or attendance at weddings. **There will be no make up final exams and a missed final exam will result in a 0 for the final.**

Computing Your Final Grade

		Letter Grade
Homework Quizzes	200 points	A: 90% - 100%
Online Homework	100 points	B: 80% - 89.9%
In-class Exams	300 points	C: 70% - 79.9%
Project	100 points	D: 60% - 69.9%
Final Exam	150 points	F: Below 60%
Total	850 points	

Other Concerns

Academic Dishonesty

Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed in the Catalog and on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, go to http://www.ucdenver.edu/academics/colleges/CLAS/faculty-

<u>staff/policies/HandlingAcademicDishonesty/Pages/Definition-of-Academic-Dishonesty.aspx</u>. This course assumes your knowledge of these policies and definitions.

Failure to adhere to them can result in possible penalties ranging from failure of this course to dismissal from the University; so, be informed and be careful. If this is unclear to you, ask me. The College of Liberal Arts and Sciences (CLAS) Ethics Bylaws allow the instructor to decide how to respond to an ethics violation, whether by lowering the assignment grade, lowering the course grade, and/or filing

charges against the student with the Academic Ethics Committee. Violating the Academic Honor Code can lead to expulsion from the University.

Disruptions

Class disruptions (cell phones, music, etc) and any other inappropriate behavior will not be tolerated. I will penalize accordingly. Please see the CU-Denver Code of Student Conduct for details.

Disabilities

Students with disabilities who need accommodations should make me aware of this either by contacting me directly or by having the Disabilities Services Office (SCB-2116; 303-315-3510) contact me by the end of week 1 of classes.

Talk to Me

I'll give my best effort to make this class run smoothly for you, but it is important that you **communicate with me when any issues arise** or if there are any problems/concerns.

Getting Help

Learning Resource Center

- Offers free tutoring and help concerning class assignments, course-loads, and study skills
- Located in SCB-2105. 303-315-3531

MERC (Math Education Resource Center)

- Free assistance on assignments
- NC 4015. 303-315-1712
- Must bring valid CU-Denver ID.

Colorado Commission on Higher Education Learning Objectives

The Colorado Commission on Higher Education has approved MATH 2830 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-MA1 category. For transferring students, successful completion with a minimum grade of C- grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to

http://highered.colorado.gov/academics/transfers/gtpathways/curriculum/html.

GT Pathways Mathematics (GT-MA1) Content Criteria:

a) Demonstrate good problem-solving habits, including:

- Estimating solutions and recognizing unreasonable results.
- Considering a variety of approaches to a given problem, and selecting one that is appropriate.
- Interpreting solutions correctly.

b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.

c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.

d) Apply mathematical concepts, procedures, and techniques appropriate to the course.

- e) Recognize and apply patterns or mathematical structure.
- f) Utilize and integrate appropriate technology.

GT Pathways Mathematics (GT-MA1) Competencies:

A. Quantitative Literacy: Competency in quantitative literacy represents a student's ability to use quantifiable information and mathematical analysis to make connections and draw conclusions. Students with strong quantitative literacy skills understand and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc.).

Students should be able to:

1. Interpret Information.

a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).

2. Represent Information.

a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

3. Perform Calculations.

a. Solve problems or equations at the appropriate course level.

b. Use appropriate mathematical notation.

c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.

4. Apply and Analyze Information

a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.

b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.

c. Make judgments based on mathematical analysis appropriate to the course level.

5. Communicate Using Mathematical Forms.

a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

6. Address Assumptions.

a. Describe and support assumptions in estimation, modeling, and data analysis, used as appropriate for the course.

B. Problem Solving: Competency in problem solving represents a student's ability to design, evaluate, and implement a strategy to answer a question or achieve a goal.

Students should be able to:

1. Define a Problem.

- a. Construct a detailed and comprehensive problem statement or goal.
- b. Identify relevant contextual factors.

2. Propose a Strategy.

a. Identify reasonable approaches to solving the problem within the given context.

3. Evaluate Potential Strategies.

a. Provide an evaluation of the potential strategy(ies) which may include:

- i. the history of the problem,
- ii. the logic behind the potential strategy(ies),
- iii. the feasibility of the proposed strategy(ies), and
- iv. the potential impacts of the proposed strategy(ies).

b. Choose a feasible strategy.

4. Apply a Strategy.

- a. Implement chosen approach(es).
- b. Gauge success of the chosen strategy(ies) and revise as needed.

Course Goals and Learning Objectives <u>CORE Learning Outcomes</u>

- 1. Calculate: Accurately and logically manipulate a mathematical representation to attain desired information.
- 2. Represent: Able to translate between representations to clearly represent information and gain insight. Representations may be expressed symbolically, graphically, numerically, or verbally.
- 3. Interpret: Draw meaningful inferences and communicate insights from mathematical representations. Mathematical representations may include statistical, graphical, algebraic,
- 4. Model: Develop and/or apply an appropriate mathematical model for a real-world problem. This can be demonstrated by e.g. developing a model, choosing an appropriate model from several, or explaining the primary assumptions needed to use a particular model.

Course Learning Outcomes MATH 2830

The following section lists the Learning Outcomes specific to the course (MATH 2830). Each Learning Outcome reflects one or more of the CORE Learning Outcomes.

The Nature of Probability & Statistics

Students will be able to...

- Demonstrate knowledge of statistical terms. (*Interpret*)
- Differentiate between the two branches of statistics. (*Interpret*)
- Identify types of data. (*Interpret*)
- Identify the four basic sampling techniques(*Interpret*)
- Explain the difference between an observational and an experimental study. (*Interpret*)
- Explain how statistics can be used and misused. (*Interpret*)

Frequency Distributions & Graphs

Students will be able to...

- Organize data using a frequency distribution. (*Interpret*)
- Represent data in frequency distributions graphically, using histograms, frequency polygons, ogives, bar graphs, Pareto charts, time series graph, pie graph, and dotplots. (*Represent*)
- Draw and interpret a stem and leaf plot. (*Represent & Interpret*)
- Translate between different graphical representations. (*Represent*)

Data Description

Students will be able to...

- Summarize data, using measures of central tendency e.g. mean, median, mode, midrange. (*Calculate*)
- Describe data, using measures of variation, such as range, variance, and standard deviation. (*Calculate*)
- Use the techniques of exploratory data analysis, including boxplots and five number summaries, to discover various aspects of data. (*Represent & Interpret*)
- Determine data sets that satisfy various criteria from the measures of central tendency and variation. (*Represent & Interpret*)
- Determine a possible five number summary from a boxplot and generate a data set that would satisfy the five number summary. (*Represent & Interpret*)

Probability & Counting Rules

Students will be able to...

- Determine samples spaces and find the probability of an event, using theoretical and empirical probability. (*Interpret & Calculate*)
- Find the probability of compound events, using the addition and multiplication rules. (*Calculate*)
- Find the conditional probability of an event. (*Calculate*)
- Find the total number of outcomes in a sequence of events, using the fundamental counting rule. *(Calculate)*

Discrete Probability Distributions

Students will be able to...

- Construct a probability distribution for a random variable. (*Represent & Interpret*)
- Find the mean, variance, standard deviation, & expected value for a discrete random variable. (*Calculate*)
- Find the exact probability for a binomial experiment. (*Calculate*)
- Find the mean, variance, standard deviation for the variable of a binomial distribution. (*Calculate*)

The Normal Distribution

Students will be able to...

- Identify the properties of a normal distribution. (*Interpret*)
- Identify distributions as symmetric or skewed. (*Interpret*)
- Find the area under the standard normal distribution, given various z values. (*Calculate*)
- Find probabilities for a normally distributed variable by transforming it into a standard normal distribution. (*Calculate*)
- Use the central limit theorem to solve problems involving sample means for large samples. (*Interpret & Calculate*)

Confidence Intervals & Sample Size

Students will be able to...

- Find the confidence interval for the mean when σ is known and unknown. (*Model & Interpret*)
- Determine the minimum sample size for finding the confidence interval for the mean. (*Calculate*)
- Find the confidence interval for a proportion. (*Model & Interpret*)
- Determine the minimum sample size for finding a confidence interval for a proportion. (*Calculate*)

Hypothesis Testing

Students will be able to...

- Understand the definitions used in hypothesis testing. (*Interpret*)
- State the null and alternative hypotheses. (*Interpret*)
- Find the critical values for the z-test. (*Calculate*)
- Test means when σ is unknown, using the t-tests. (*Model & Interpret*)
- Test proportions, using a z-test. (Model & Interpret)

Testing the Difference Between Two Means & Two Proportions

Students will be able to ...

- Test the difference between two means for independent samples, using the t-test. (Model & Interpret)
- Test the difference between two means for dependents samples. (Model & Interpret)
- Test the difference between two proportions. (*Model & Interpret*)

Correlation & Regression

Students will be able to...

- Draw a scatterplot for a set of ordered pairs. (*Represent*)
- Compute the correlation coefficient. (*Calculate*)
- Test correlation coefficients using the t-test. (*Model & Interpret*)
- Compute the equation of the regression line. (*Calculate*)
- Make predictions using the regression line. (*Interpret*)

Other Chi-Square Tests

• Test a distribution for goodness of fit, using chi-square. (Model & Interpret)

INTRODUCTORY STATISCTICS MATH 2830 TENTATIVE COURSE SCHEDULE

Week of:	Sections	
January 15 th	Martin Luther King Day – No Class Monday	
	1-1, 1-2, 1-3, 1-4	
January 22 nd	2-1, 2-2, 2-3, 3-1 (no grouped data) Q1	
January 29 th	3-1, 3-2, 3-4 Q2	
February 5 th	Evaluating Research Guidelines (ERG), 4-1, Exam 1 (Chapters 1-3)	
February 12 th	4-2, 4-3, 5-1, ERG Q3	
February 19 th	5-2, 5-3, 6-1, ERG Q4	
February 26 th	6-2, 6-3, 7-1 Q5	
March 5 th	7-3, Exam 2 (Chapters 4-6)	
March 12 th	7-2, 8-1, Q6	
March 19 th	No Class – Spring Break	
March 26 th	8-2 (brief), 8-3, 8-4 Q7	
April 2 nd	8-4, 9-2, 9-3 Q8	
April 9 th	9-4, 10-1, Q9	
April 16 th	10-2, 11-1 Q10	
April 23 rd	Project Presentations, Exam 3 (Chapters 7-10)	
April 30 th	Project Presentations Q11	
May 5 th	Uniform Final 9am – Noon	

NOTE: I reserve the right to change the schedule throughout the course of the semester.

Academic Policies

The following policies, procedures, and deadlines pertain to all students taking courses in the College of Liberal Arts and Sciences (CLAS). They are aligned with the Official University Academic Calendar found on the <u>Registrar's website</u>.

Schedule Verification

It is each student's responsibility to verify that their official registration and schedule of courses is correct in UCDAccess (*not* Canvas) before courses begin and by the university census date. Failure to verify schedule accuracy is not sufficient reason to justify post-census date adds. Access to a course through Canvas is not evidence of official enrollment.

Email

Students must activate and regularly check their official CU Denver email account for university related messages. Note: Canvas is not the location to access your CU Denver email account. Log into http://www.ucdenver.edu/email/Pages/login.aspx

Administrative Drops

Students may be administratively dropped if they do not meet the pre- and/or co-requisites for a course as detailed in the UCDAccess registration system. Students may also be administratively dropped from a course if the course syllabus articulates attendance expectations prior to census date and they do not meet those attendance expectations. Please note: this procedure does not apply to all courses and students should not rely upon it; if students plan to no longer complete a course, they are responsible to drop or withdraw from the course.

Post-Census Date Adds and Late Withdrawals

Post-census date adds (i.e., adding a course after census date) require a written petition, verifiable documentation, and dean's approval via CLAS Advising. Late withdrawals (i.e., withdrawing from one or more full-semester courses after the withdrawal deadline but before the late withdrawal deadline) require a Late Withdrawal Petition submitted to CLAS Advising (NC 1030 – 303-315-7100). If petitioning to late-withdraw from individual courses, instructor signatures are required. If petitioning to late-withdraw from the entire semester, instructor signatures are not required. Contact CLAS Advising (NC 1030 – 303-315-7100) for more information on post-census date adds and late withdrawals.

Co-Requisites and Drops/Withdrawals

Students dropping a course with co-requisite(s) before or by census date must drop the course and co-requisite(s). After census date, students withdrawing from a course with co-requisite(s) before or by the withdrawal deadline must withdraw from the course and co-requisite(s). After the withdrawal deadline, until the late withdrawal deadline, students may be able to withdraw from a course or co-requisite(s) based on instructor permission and approval of a Late Withdrawal Petition.

Waitlists

The Office of the Registrar notifies students via their CU Denver email account if they are added to a course from a waitlist. Students will have access to Canvas when they are on a waitlist, but this does not indicate that the student is officially enrolled or guaranteed a seat in the course. If a student is not enrolled in a course after waitlists are purged, instructor permission is required for the student to enroll in the course. The student must complete a Late Add Form and submit it to the Registrar's Office (SCB 5005) by census date in order to enroll in the course.

Applicable Fo	brms		
Schedule Adjustment Form	Submi	t to Registrar (SCB 5005)	
Purpose:	Approval Signatures Required:	Dates:	
Receive an academic overload	Student and CLAS Advising signatures	before Jan. 31 (5pm)	
Receive a time conflict override	Student and instructor signatures	before Jan. 31 (5pm)	
Designate a course pass/fail or no credit	Student signature	before Jan. 31 (5pm)	
Withdraw from an intensive course before the withdrawal deadline	Student signature	Feb. 1 – April 1 (5pm)	
Late Add Form	Submit to Registrar (SCB 5005)		
Purpose:	Approval Signatures Required:	Dates:	
Add a course after the add deadline but before census date	Student and instructor signatures	Jan. 22 – Jan. 31 (5pm)	
Post-Census Date Add Petition	Visit CLAS Advising (NC 1030) for more information		
Purpose:	Approval Required:	Dates:	
Petition to add one or more full-semester courses after census date	Submitted petitions are reviewed by	after Jan. 31	
(verifiable documentation required)	the CLAS Assistant Dean		
te Withdrawal Petition Submit to CLAS Advising (N		CLAS Advising (NC 1030)	
Purpose:	Approval Signatures Required:	Dates:	
Petition to late-withdraw from a course after the withdrawal deadline but before	Student and instructor signatures	April 2 – May 2 (5pm)	
the late withdrawal deadline			
Petition to late-withdraw from <u>all courses</u> in the semester after the withdrawal	Student signature	April 2 – May 2 (5pm)	
deadline but before the late withdrawal deadline			

	Academic Calendar
January 16	Beginning of Semester – First day of classes.
January 21 (11:59 pm)	Add Deadline – Last day to add or waitlist a course using UCDAccess. After the add deadline but before census date, instructor permission on a <u>Late Add Form</u> is required to add courses.
January 22 (11:59 pm)	Drop Deadline – Last day to drop a course without \$100 drop fee, including section changes (i.e., changing to a different section of the same course). Students may drop courses using UCDAccess.
	No Adding of Courses is Permitted Today
	Waitlists Purged – All waitlists are eliminated today. Students should check their schedule in UCDAccess to confirm the courses in which they are officially enrolled. Canvas does not reflect official enrollment.
January 31 (5 pm) Ceusns Date	 Final Add Deadline (Instructor Permission Required) Last day to add full-semester courses. To add a full-semester course between the first add deadline and census date, instructor permission on a Late Add Form is required. Students may submit a completed Late Add Form to the Registrar's Office (SCB 5005). After census date, a written petition, verifiable documentation, and dean's approval via CLAS Advising (NC 1030 – 303-315-7100) are required to add a full-semester course. If a student's post-census date add petition is approved, the student will be charged the full tuition amount. College Opportunity Fund (COF) may not apply to courses added late, and these credits may not be deducted from students' lifetime hours. Final Drop Deadline Last day to drop full-semester courses with a financial adjustment. Each course dropped, including section changes, between the first drop deadline and census date, withdrawal from courses appears on transcripts with a grade of "W," and no financial adjustment is made. After census date but before the withdrawal deadline, students may withdraw from full-semester courses using UCDAccess (instructor permission is not required). Graduation Application Deadline Last day to apply for graduation. Undergraduates are expected to make an appointment to see their academic advisors before census date to apply for graduation. Graduate students must complete the Intent to Graduate and Candidate for Degree forms. Pass/Fail, No Credit Deadline – Last day to request No Credit or Pass/Fail grade for a course using a <u>Schedule Adjustment Form</u>.
March 19 – 25	Spring Break – No classes. Campus open.
April 1 (11:59 pm)	Withdrawal DeadlineAfter census date, students may withdraw from full-semester courses using UCDAccess (instructor permission is not required). To withdraw from an intensive course, students may use a Schedule Adjustment Form.Withdrawal from courses appears on transcripts with a grade of "W" and no financial adjustment is made.After the withdrawal deadline but before the late withdrawal deadline, students may late-withdraw by submitting a Late Withdrawal Petition to CLAS Advising (NC 1030 – 303-315-7100). Contact CLAS Advising (NC 1030 – 303-315-7100) for more information.After census date, students withdrawing from a course with co-requisite(s) before or by the withdrawal deadline must withdraw from the course and co-requisite(s). After the withdrawal deadline, until the late withdrawal deadline, students may be able to withdraw from a course or co-requisite(s) based on instructor permission and approval of a Late Withdrawal Petition.
May 2 (5 pm)	Late Withdrawal Deadline Last day to petition to late-withdraw from one or more full-semester courses. Students may petition to late-withdraw by submitting a Late Withdrawal Petition to CLAS Advising (NC 1030 – 303-315-7100). If petitioning to late-withdraw from individual courses, instructor signatures are required. If petitioning to late-withdraw from the entire semester, instructor signatures are not required. Contact CLAS Advising (NC 1030 – 303-315-7100) for more information. After the withdrawal deadline, until the late withdrawal deadline, students may be able to withdraw from a course with co-requisite(s) based on instructor permission and approval of a Late Withdrawal Petition. After the late withdrawal deadline (or after grades are posted, whichever is sooner), only retroactive withdrawals are considered and verifiable documentation is required. Contact CLAS Advising (NC 1030 – 303-315-7100) for more information on retroactive withdrawals.
May 7 – 12	Finals Week
May 12	End of Semester
	Commencement Ceremony
May 17	Final Grades Available – Official grades available in UCDAccess and transcripts (tentative). Canvas does not display final grades.
June 22	Degrees Posted – Degrees posted for graduating students on transcripts.