

**Statistic Literacy (STAT-02102-7), CRN 22585**  
**Rowan University Department of Mathematics**  
**Spring 2020**

**Instructor:** Kevin Farrow

**Class Meetings:** Monday and Wednesday 5:00-6:15pm, RUCAB 336

**Office Hours:** Monday and Wednesday 4:30-5:00pm, 6:15 – 6:45pm

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**Prerequisites: Must meet** one of these:

**Must have Completed:** ALG 62 or ALGR 62 or SO2 400 Or Minimum Grade of D- on either of these Course or Test: MATH 01100 to 01499 or Course or Test: STAT 02100 to 02499 or A02 17 or S12 440 or Math 01075 or **Minimum Grade of S on either: MATH 01090, Math 01094, Math 01095 or course or Test: Math 03100 to 3499. Cannot be taken concurrently.**

**Course Description:** This course aims to introduce non-STEM majors to the critical thinking skills they need to understand statistical topics that they may encounter in the popular media or their future careers. Students will learn to critically evaluate the statistical information they encounter during everyday life, with a focus on becoming intelligent consumers, rather than producers, of data. Emphasis will be placed on discussing and analyzing cases studies drawn from a variety of professional disciplines as well as the popular press.

**Course Objectives:**

1. Student will understand and apply the fundamental concepts of sampling and probability.
  - a. 1.1. Student will learn the fundamental concepts of sampling and be familiar with common sampling schemes and recognize sampling schemes in real-world situations including media and case studies.
  - b. 1.2 Student will learn the basic concepts of probability, and be able to identify some fallacious arguments involving probability.
2. Students will interpret basic computed numerical summaries and graphical displays coming from statistical software computed/created by the student or published in an article/case study.
  - a. 2.1 Students will learn to interpret basic computed numerical summaries and graphical displays coming from statistical software computed/created by the student or published in an article/case study.
3. Students will understand the purpose behind interval estimation and tests of hypotheses.
  - a. 3.1 Students will be able to explain the rationale behind interval estimation and tests of hypotheses.
4. Students will understand simulation based distributions.
  - a. 4.1 Students will utilize technology to produce appropriate bootstrap distributions and randomization based distributions.
5. Students will understand the basic concepts of simulation based statistical inferences.
  - a. 5.1 Students will understand how to use a bootstrap distribution for applying the concepts of estimation and confidence intervals. b. 5.2 Students will understand the concepts of decision making with statistical tests of hypotheses and use randomization distributions to test parameter claims.

The syllabus for this course does include all of the following Course Objectives that have been aligned with Rowan Core Outcomes:

- Students will utilize appropriate technology to create bootstrap and randomization distributions.
- Students will a) construct and interpret confidence intervals based on bootstrap distributions, b) conduct formal hypothesis tests based on randomization distributions, and c) learn how confidence intervals relate to hypothesis tests.
- Students will interpret basic computed numerical summaries and graphical displays coming from statistical software computed/created by the student or published in an article/case study.

**Rowan Core (General Education):** As of Fall 2018, all first-year undergraduate students at Rowan University must complete the new general education requirements, known as Rowan Core. (Continuing students and new transfer students will follow the existing general education requirements.) Students in Rowan Core must complete course requirements in six literacies: Artistic, Communicative, Global, Humanistic, Quantitative and Scientific. Statistical Literacy belongs to the Quantitative Literacy. All students in this course will be assessed on the following Rowan Core Learning Outcomes for this literacy:

- Students can perform basic analyses on both discrete and continuous data.
- Students will evaluate the appropriateness and limitations of deterministic and probabilistic models to make informed decisions in real world situations.
- Students can define basic statistical and regression vocabulary and also qualitatively describe the meanings relative to a set of given data (e.g. mean vs. median, what does the standard deviation represent; correlation coefficients, and model parameters/

For details on the new Rowan Core and existing general education requirements, please consult your advisor or the 2019-20 Undergraduate Catalog (<https://sites.rowan.edu/catalogs/>).

**Required Textbook:**

2015, Utts, Jessica M., "Seeing through Statistics" 4th edition, Cengage publishing. Read the assigned sections in the book before coming to class!

**Blackboard:** You can obtain handouts, lecture slides, study guides, answer keys, grades, etc. from the Blackboard site for this course. Go to <https://rowan.blackboard.com> and log on with your Rowan e-mail username and password. Any updates to the lecture schedule or homework assignments will be announced on Blackboard, but you should also check your Rowan e-mail account daily for any announcements regarding this course.

**Course Assignments and Requirements:**

**A. Attendance and Participation.** According to the University's Attendance Policy, "Students are expected to be present at each meeting of each scheduled class for which they are officially registered." You are always responsible for what occurs in each class that you miss (excused or unexcused).

Attendance will be recorded, and excessive absences make it very difficult to be successful in this class. Lectures are designed to supplement the textbook material, not to duplicate it. Given that lectures will include material not covered by the textbook, it is in your best interest not to miss class. If you must miss a class, arrange to obtain the lecture notes from a classmate and go to Blackboard to obtain any lecture handouts. Participation in class discussion and activities also will be factored into borderline course grades. Don't hesitate to raise your hand if you have a question during lecture.

**B. Weekly Homework Assignments.** Homework problems are assigned for each section and a hard copy is due at the beginning of class on the due date. Your homework grade will be based on your sincere effort to complete each problem. If you are not in class on the due date, you must scan or take pictures of the homework and email them to me by the start of class in order to receive credit for the assignment. Late homework will not be accepted.

**C. Quizzes:** Some short quizzes will be given throughout the course. Some quizzes will be announced, some will be unannounced. The quizzes are intended to help you gauge your progress with plenty of time to course-correct well in advance of the exams. Your lowest of the quiz grades will be dropped; however, if you are absent on a quiz day you

will receive a zero and there is no opportunity to make up the quiz (it will be your dropped quiz). You are permitted (and expected) to use your scientific calculator on each quiz.

**D. Exams:** There will be a midterm exam and a cumulative final exam. You are permitted (and expected) to use a scientific calculator during each exam. In the event of a truly unavoidable absence that can be documented, you must contact me as soon as you know that you will be unable to attend an exam and provide me with official, written documentation of the reason for your absence; otherwise, you will receive a “0” for any missed exam (and most likely fail the course).

**Grading Scheme:**

- Homework / Quizzes 20%
- Projects 25%
- Midterm exam 25%
- Final exam 30%

**Grading Scale:** After your scores on individual grade components are weighted according to the above percentages, your final course grade will be determined as follows:

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

**Academic Integrity:** Please familiarize yourself with Rowan’s Academic Integrity Policy:

<https://confluence.rowan.edu/display/POLICY/Academic+Integrity+Policy> Cheating on quizzes or exams (such as but not limited to copying others’ work, communicating with others during the exam, or using unauthorized materials) will be reported to the Provost’s office in accordance with university policy and will most likely result in a course grade of “F.” You are welcome to collaborate with other students on homework as long as your answers are written in your own words.

**Tutoring:** Free tutoring is available through the Tutoring Center (x4460, Savitz Hall) or in the Mathematics Learning Center. Check out these options as soon as possible, and contact Prof. Dickerson right away if these options are not meeting your needs!

**Starfish:** The Rowan Success Network powered by Starfish® is designed to make it easier for you to connect with the resources you need to be successful at Rowan. Throughout the term, you may receive email from the Rowan Success Network team (Starfish®) regarding your academic performance. Please pay attention to these emails and consider taking the recommended actions. Additional information about RSN may be found at [www.rowan.edu/rsn](http://www.rowan.edu/rsn).

**Students with Disabilities:** Your academic success is important. If you have a documented disability that may have an impact upon your work in this class, please contact your instructor. Students must provide documentation of their disability to the Academic Success Center in order to receive official University services and accommodations. The Center is located on the 3rd floor of Savitz Hall. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations. The Academic Success Center can be reached at 856-256-4234. Their website is located at <http://www.rowan.edu/studentaffairs/asc/disabilityresources/>

**Tentative schedule on the next page:** any changes will be announced in class and posted on Blackboard.

Date	Day	Class	Items to be covered	Text Reference	Homework
1/22/20	W	1	Benefits and Risks of Using Statistics	Chpt 1	6, 9, 11, 12, 15, 21, 22
1/27/20	M	2	Statistics in the News/Media	Chpt 2	7, 9, 16
1/29/20	W	3	Measurements, Mistakes and Misunderstandings	Chpt 3	2, 3, 4, 6, 8, 10, 21 - 26
2/3/20	M	4	Sampling Strategies	Chpt 4	1 - 3, 8, 9, 12, 17, 21
2/5/20	W	5	Experimental versus Observational Studies: Defining, Designing and Difficulties/Disasters of Experiments	Chpt 5.1 - 5.3	
2/10/20	M	6	Experimental vs Observational Studies: Designing, Difficulties and Disasters of Obs Studies & Random Sample vs Random Assignment	Chpt 5.4-5.6	2 - 5, 14, 16, 17, 33 - 35
2/12/20	W	7	Study Evaluations/Critiques: Case Studies	Chpt 6	
2/17/20	M	8	Summarizing Data: Measurements and Displays: Measures of Center, Basic Measures of Variability & Outliers	Chpt 7.1	
2/19/20	W	9	Summarizing Data: Measurements and Displays: Graphical Displays (skipping stem plots) & Depth on Measures of variability. <b>Take Home section: Caution: Being average is not Normal (Sec. 7.6)</b>	7.2 - 7.5	5 - 7, 36 - 38, 42
2/24/20	M	10	Bell -Shaped Curves , Empirical Rule and Measures of Location/Relative Standing	Chpt 8	1, 3, 4, 6, 7, 9, 11, 18, 19, 23
2/26/20	W	11	Plots, Graphs, and Pictures: Insights, Difficulties, and Disasters	Chpt 9	9ab, 15, 18, 20, 25
3/2/20	M	12	Correlation and Proper Application of Simple Linear Regression	Chpt 10	7 - 15
3/4/20	W	13	Outlier impacts , Correlation versus Causation, Confirming Causation	Chpt 11	1 - 4, 10, 14 - 16, 23, 30
3/9/20	M	14	Midterm Exam	all topics to date	
3/11/20	W	15	Relationship between Categorical variables	Chpt 12.1-12.3	1, 3, 4, 5, 8, 12, 21
3/16/20	M	None	Spring Break		
3/18/20	W	None	Spring Break		
3/23/20	M	16	Understanding Probability	Chpt 14	2, 6, 7, 12, 19 - 21, 25, 27, 32
3/25/20	W	17	Psychological Influences on Personal Probability & When Intuition Differs from Relative Frequency	Chpt 16 & 17	(16): 2, 3, 5, 7, 9 (17): 13, 14, 27
3/30/20	M	18	Diversity of Samples from Same Population	Chpt 19	HW t.b.a on Blackboard
4/1/20	W	19	Estimating parameter: Bootstrap Confidence interval for single Proportion	20.1-20.2 & Handout	HW t.b.a.
4/6/20	M	20	Estimate parameter: Bootstrap Confidence interval for single mean	21.1 & Handout	HW t.b.a.
4/8/20	W	21	Estimating Parameter: Bootstrap Confidence Interval for difference between two means	Handout	HW t.b.a.
4/13/20	M	22	Introduction to Hypothesis Testing & Understanding Uncertainty through Simulation	Chpt 13.1-13.2 22.1 & 15.1-15.2	HW t.b.a.
4/15/20	W	23	Randomization Test: Single parameter: single mean vs single proportion	Handout	HW t.b.a.
4/20/20	M	24	Randomization Test: Difference between parameters: two means	Handout	HW t.b.a.
4/22/20	W	25	Type I & Type II errors and Randomization tests: two categorical variables	Chpt 22.4 & Chpt 15.3	HW t.b.a.
4/27/20	M	26	Significance, Importance and Undetected Differences Resolving Inconsistencies across Studies	Chpt 24 & 25	HW t.b.a.
4/29/20	W	27	Ethics in Statistical Studies	Chpt 26	
5/4-5/9	?		<b>Comprehensive Final Exam</b> as Scheduled by Registrar: see Section Tally OR latest email from Registrar on Final Exam schedule.		