Title of Course: Elementary Statistics and Inference
STAT:1020 / PSQF:1020 Lecture Section A

Course Meeting Time and Place: 8:30 – 9:20 am M, W, F; 101 BCSB

Department of Statistics and Actuarial Science: https://stat.uiowa.edu/

Course ICON Site: To access the course site, log into Iowa Courses Online (ICON) using your Hawk ID and password.

Course Home
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the "second-grade only" option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook

Instructor:	Dr. Ankenmann
Office location:	S316 LC
Office hours:	10:30 am – 12 noon, M, W, F, or by appointment; S316 LC
E-mail:	robert-ankenmann@uiowa.edu
DEO:	Dr. Kung-Sik Chan, 241 SH, kung-sik-chan@uiowa.edu

Teaching Assistant:	Talia Gafrick, talia-gafrick@uiowa.edu				
	Discussion	A13	9:30 – 10:20 am	T	31 SH
	Sections	A15	11:00 – 11:50 am	T	E224 CB
		A14	9:30 – 10:20 am	Th	31 SH
		A16	11:00 – 11:50 am	T	E224 CB
	Office Hours	9:30 – 10:30 am, M, W, F; 267 SH			

Course Description
This course provides an overview of the logic and techniques involved in quantitatively analyzing and interpreting empirical data. Methods for displaying data graphically and for describing characteristics of data will be covered in the first part of the course dealing with descriptive statistics. The second part of the course includes topics in elementary probability theory and sampling, forming a basis for techniques of statistical inference. The problem of inference, attempting to make generalizations that go beyond the data at hand, is the focus of the third part of the course.

Learning Objectives
This is a *General Education* course in *Quantitative or Formal Reasoning*. Courses approved in this area have as their primary purpose the development of the analytical powers of the student as they might be exercised in presentation and evaluation of mathematical or other formal symbolic systems. Students will learn and practice methods of statistical reasoning. Students

will also learn to evaluate arguments made in the symbolic system embodied in the course, and will become familiar with its major concepts and ways of formulating questions.

Textbook/Materials

The required textbook for this course is an E-text:
- Intro Stats, 6th Edition
- E-text ISBN: 9780136806905, 0136806902
- Richard D. De Veaux; Paul F. Velleman; David E. Bock
- Pearson
- 2022

- You can get to the E-text (and a variety of other tools) from the **MyLab Statistics** Module on the ICON course website

- Handouts for lectures and discussion sections, as well exam review questions and answers/solutions, will be posted on the ICON course website

Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty. Undergraduate academic misconduct must be reported by instructors to CLAS according to these procedures. Collaboration among students is permitted on homework assignments. Students must work alone on all three exams.

Student Complaints
Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course. Students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level.

Drop Deadline for this Course
You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. When you drop a course, a "W" will appear on your transcript. The mark of "W" is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the Registrar's website. Undergraduate students can find policies on dropping and withdrawing here.

Course Requirements

- readings (see **Lecture Schedule** for textbook chapters and topics)

- exercises from textbook (for self study, and for review in discussion sections with the TA); see **Recommended Textbook Exercises**

- students are expected to attend all lectures and discussion sections

- 10 graded homework assignments; see **Graded Homework Assignment Schedule** (below) for deadlines

- 3 exams (open book), each consisting of 30 multiple-choice questions; see **Exam Schedule** (below) for dates, times, locations, and content coverage; review questions and answers/solutions will be posted on ICON at least one week before each exam; exams are based on content covered in textbook readings, lectures, discussion sections, graded homework assignments, recommended textbook exercises, and review questions posted on ICON

Course Grades
Final grades are based on the best 9 out of 10 homework assignments (approximately 2.78% each; 25% altogether), and three exams (25% each).

Grading System and the Use of +/-
Final grades will be awarded based on the following ranges:

A	B	C	D	F
A+ 96 – 100	B+ 79 – 83	C+ 62 – 66	D+ 45 – 49	F 0 – 34
A 89 – 95	B 72 – 78	C 55 – 61	D 40 – 44	
A- 84 – 88	B- 67 – 71	C- 50 – 54	D- 35 – 39	

- these are *guaranteed cutoffs* so it's possible, but unlikely, that everybody receives a grade in the A range

- with this grading system *you are NOT graded on a curve*, so you aren't competing against other students

- students with an average homework assignment score exceeding 75% (based on the best 9 out of 10 homework assignments) will be eligible for borderline grade consideration for final grades (for example, if a student has an overall score of 66, and their average homework score is at least 75%, their grade would move from C+ up to B-)

- absence from an exam must be cleared with Dr. Ankenmann on or before the exam date

- any student who is absent from an exam must submit a completed *Absence Explanation Form* to Dr. Ankenmann before being allowed to take a make-up (see https://registrar.uiowa.edu/sites/registrar.uiowa.edu/files/wysiwyg_uploads/absence_explanation_form2019revised.pdf)

- any unexcused absence from an exam will result in a score of zero with no opportunity for a make-up

Date and Time of the Final Exam

The final examination date and time will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to Registrar's final exam policy, **students have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams in one day (see the policy here).

Calendar of Course Assignments and Exams

Graded	HW Assignment 1	Wed Feb 5, 11:59 pm	Chapters 1, 2.1 – 2.3
Homework	HW Assignment 2	Wed Feb 12, 11:59 pm	Chapters 2.4, 2.5, 3
Assignment	HW Assignment 3	Wed Feb 19, 11:59 pm	Chapters 3, 4
Schedule	HW Assignment 4	Wed Feb 26, 11:59 pm	Chapter 5
	HW Assignment 5	Wed Mar 12, 11:59 pm	Chapters 7, 8.1, 8.3, 8.5
	HW Assignment 6	Wed Apr 2, 11:59 pm	Chapter 10
	HW Assignment 7	Wed Apr 9, 11:59 pm	Chapter 12
	HW Assignment 8	Fri Apr 25, 11:59 pm	Chapters 13, 14
	HW Assignment 9	Fri May 2, 11:59 pm	Chapters 15, 16.3
	HW Assignment 10	Fri May 9, 11:59 pm	Chapter 17

- homework assignments are due at 11:59 pm on Wednesday (HW 1 – 7) or Friday (HW 8 – 10); late submissions are accepted up until 11:59 pm on Sunday (that is, four days later for HW 1 – 7, or two days later for HW 8 – 10) with a 50% penalty on those questions answered after the Wednesday/Friday deadline; there are no exceptions or extensions to these deadlines for any reason

Exam	Exam 1	Thrs Feb 27, 6:30 – 8:30 pm, 100 PH	Chapters 1 – 6, 8.3 – 8.5
Schedule	Exam 2	Thrs Apr 10, 6:30 – 8:30 pm, 100 PH	Chapters 7, 8.1 – 8.2, 10, 12
	Exam 3	May 12 – 16, Date/Time/Location TBA	Chapters 13 – 15, 17 – 19

- students who have a conflict with either of the first two exams must make arrangements for a makeup with Dr. Ankenmann the week before the exam; makeup exams will occur earlier on the day of the exam, or the next day

- students with accommodations must make alternative arrangements with Dr. Ankenmann the week before the exam; exam accommodations will occur earlier on the day of the exam, or the next day

- the Final Exam Schedule is set by the Registrar's Office during the first five weeks of the semester; the date/time/location of Exam 3 will be announced after it has been set by the Registrar's Office

- the Registrar's Office defines/recognizes the following two kinds of exam conflicts: (1) two or more final exams scheduled during the same exam period, (2) more than two final exams scheduled on the same day; these are the only kinds of exam conflicts allowed by Dr. Ankenmann

- please note that travel arrangements, including airline flights, do not qualify as exam conflicts; therefore, students should not book any travel during Exam Week (May 12 – 16) until after they know the date and time of Exam 3

- students who have a qualifying exam conflict (as defined above) may request a makeup final examination from the instructor; they must register their intent to take advantage of the makeup exam opportunity with their instructor by March 1; the makeup exam period is Friday, May 16 from 5:30 – 7:30 pm

- students with accommodations must make alternative arrangements with Professor Ankenmann the week before the exam; exam accommodations will occur on the day of the exam, or the next day

Recommended Textbook Exercises

Students are expected to know how to answer all of these exercises, even though they aren't scored/graded. Some of these questions are included in (or similar to) the homework assignments, and some are used as examples in lectures and/or discussion sections.

Chapter 1: 1, 7, 9, 21, 23, 25, 31, 33, 35, 37, 39

Chapter 2: 1, 3, 5, 13, 15, 17, 21, 23, 35, 39, 43, 45, 47, 53, 59, 61, 63, 65, 67, 71, 73, 79, 81

Chapter 3: 1, 3, 5, 9, 11, 15, 19, 23, 27, 29, 31, 35, 37, 41, 43

Chapter 4: 1, 3, 5, 7, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33

Chapter 5: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57

Review (pages 163 – 172): 3, 5, 7, 15, 17, 19, 23, 25, 31, 37

Chapter 6: 3, 5, 7, 11, 13, 15, 19, 25, 27, 29, 31, 33, 35, 37, 39, 45

Chapter 7: 1, 3, 5, 7, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 29, 33, 35, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 67, 69, 75

Review (pages 323 – 334): 1, 3, 7, 9, 11, 15, 17, 21, 29, 31, 33, 43

Chapter 10: 5, 7, 9, 11, 13, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45

Review (pages 385 – 390): 1, 3, 5, 7, 9, 11, 13, 15, 17, 21, 23, 25, 27, 35, 39

Chapter 12: 3, 5, 7, 9, 10, 11, 12, 14, 23, 27, 31, 33, 35, 37, 39, 41, 43, 51, 53, 63

Chapter 13: 1, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53

Chapter 14: 5, 9, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37

Chapter 15: 1, 3, 5 (only b and c), 7, 9, 15, 17, 19, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43

Chapter 17: 1, 3, 9, 11, 13, 15, 23, 25, 27, 29, 31, 33, 37, 39, 49, 51, 53, 57, 59, 61, 63, 75, 77, 83

Chapter 18: 1, 9, 13, 23 (only a and b), 25, 27 (only a and b), 29, 31, 33, 39

Chapter 19: 1, 3, 5, 13, 17, 19, 23, 25, 27, 39, 41, 47, 49

Review (pages 724 – 733): 5, 11, 17, 19, 21, 31, 33, 35, 37, 47

ICON Direct Information

- This class will be taught with electronic content. The course material is available in the ICON course site. Students may opt out of this content, but the consequences of doing so may affect their outcomes in this course.

- Students will lose access to any additional content the instructor might add to the eTextbook, such as links to other content; additional supplemental resources; and highlights, annotations, and any study tips the instructor may add to guide your engagement and learning in the course*. **Please consider that if you choose to opt out, you may not be able to earn course points or assignment grades associated with this content.**

- Students risk falling behind in the course if they have not acquired alternate versions of the same materials prior to the first day of the class.

- Faculty are not responsible for providing students with alternative materials or waiving course/class requirements.

College of Liberal Arts and Sciences (CLAS) Course Policies
Attendance and Absences

- lecture and discussion section attendance are not recorded, and do not count directly toward the final grade; however, it is expected that students attend all lectures and discussion sections in order to be adequately prepared for the exams

- this is a 3-semester-hour course; therefore, students are expected to spend (on average) 6 additional hours of outside work per week (not including discussion sections or exams), for a total of 10 hours per week if lecture and discussion section times are included

- of course, you need to keep in mind that the '6 additional hours of outside work per week' is an average taken over the weeks in the semester and over a diverse collection of students and courses; thus, effort amounts will vary from week to week and from student to student; however, it's fair to say that the more effort you put in, the more you will get out of the course

University regulations require that students be allowed to make up examinations that have been missed due to illness, religious holy days, military service obligations (including service-related medical appointments), or other unavoidable circumstances or University-sponsored activities. Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Exam Policies

Communication: UI Email
Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Where to Academic Support for this Course
Information about tutoring will be available here starting the second week of class: https://stat.uiowa.edu/resources/tutoring. Tutoring is also available from the *Tutor Iowa* academic support site: https://tutor.uiowa.edu/.

Mental Health Resources and Student Support
Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact *University Counseling Service (UCS)*. Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at mentalhealth.uiowa.edu.

Student Care and Assistance provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

University Policies

Accommodations for Students with Disabilities
The University is committed to providing an educational experience that is accessible to all. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through Student Disability Services (SDS). SDS is responsible for making Letters of Accommodation (LOA) available. **The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated.** The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the. SDS website.

Free Speech and Expression

Absences for Religious Holy Days

Classroom Expectations

Non-discrimination

Sexual Harassment/Misconduct and Supportive Measures

Sharing of Class Recordings

Lecture Schedule

DAY	DATE		TEXTBOOK	TOPIC
PART 1 – EXPLORING DATA & RELATIONSHIPS BETWEEN VARIABLES (CHAPTERS 1 – 6, 8.3 – 8.5)				
1	Jan. 22	W	1.1 – 1.4	Introduction to Statistics; Data; Variables; Models
2	24	F	2.1	Summarizing and Displaying a Categorical Variable
3	27	M	2.2	Displaying a Quantitative Variable
4	29	W	2.3 – 2.4	Shape; Center (Mean, Mode, Median)
5	31	F	2.5	Spread (Range, Interquartile Range, Standard Deviation)
6	Feb. 3	M	2.5	Spread; Relationships Among Shape, Center, Spread
7	5	W	3.1 – 3.2	Contingency Tables; Conditional Distributions
8	7	F	3.2 – 3.4	Independence/Association; Displaying Contingency Tables
9	10	M	4.1 – 4.2	Displays for Comparing Groups; Boxplots; Outliers
10	12	W	5.1 – 5.2	Using the SD to Standardize Values; Shifting and Scaling
11	14	F	5.1 – 5.2	Normal Models
12	17	M	5.3	Normal Percentiles; Normal Probability Plots
13	19	W	5.4 – 5.5	Scatterplots; Correlation
14	21	F	6.1 – 6.2	Correlation ≠ Causation; Outliers; Ecological Correlation
15	24	M	6.2 – 6.3, 8.3 – 8.5	Least Squares Line of Best Fit; The Linear Model
PART 2 – LINEAR REGRESSION, GATHERING DATA, & PROBABILITY (CHAPTERS 7, 8.1 – 8.2, 10, 12)				
16	26	W	7.1 – 7.3	The Linear Model; Finding the Least Squares Line
EXAM 1	**27**	**TH**	**(Chpt 1 – 6, 8.3 – 8.5), 6:30 – 8:30 pm, 100 PH**	
17	28	F	7.1 – 7.3	The Linear Model; Finding the Least Squares Line
18	Mar. 3	M	7.3 – 7.4	Finding the Least Squares Line; Regression to the Mean
19	5	W	7.5, 8.1	Residuals; The Residual SD; Examining Residuals
20	7	F	7.6 – 7.7, 8.2	R-Squared; Assumptions and Conditions; Extrapolation
21	10	M	10.1 – 10.3	Sampling; Populations and Parameters; SRS
22	12	W	10.4 – 10.7	Other Designs; Generalization; The Valid Survey; Mistakes
23	14	F	12.1 – 12.3	Random Phenomena; Law of Lrge Numbers; Theoretical Prob
*	SPRING BREAK (Mar. 17 – 21)			No Classes
24	24	M	12.3	Disjoint Events; Simple & Gen Addition Rules; Venn Diagrams
25	26	W	12.3 – 12.4	Independent Events; Simple Multipl'tn Rule; Conditional Probs
26	28	F	12.4 – 12.5	General Multiplication Rule; Conditional Probability Rule
27	31	M	12.4 – 12.5	General Multipl'tn Rule, Conditional Probs, and Independence
PART 3 – CONFIDENCE INTERVALS & INFERENCE (CHAPTERS 13 – 15, 17 – 19)				
28	Apr. 2	W	12.6	Picturing Probability: Tables, Venn Diagrams, Tree Diagrams
29	4	F	13.1 – 13.2	Sampling Dist'n of the Proportion; Assumptions and Conditions
30	7	M	13.3	Confidence Interval for a Proportion
31	9	W	13.4	Interpretation of a CI
EXAM 2	**10**	**TH**	**(Chpt 7, 8.1 – 8.2, 10, 12), 6:30 – 8:30 pm, 100 PH**	
32	11	F	13.5 – 13.6	Margin of Error (Certainty v Precision); Choosing Sample Size
33	14	M	14.1	Sampling Dist'n of the Mean; Central Limit Theorem
34	16	W	14.2, 14.3, 14.5	Confidence Interval for a Mean; Interpreting CIs
35	18	F	15.1 – 15.3	Hypotheses; P-Values; The Logic of Hypothesis Testing
36	21	M	15.1 – 15.3	z-Test for a Population Proportion
37	23	W	15.4 – 15.5, 16.3	t-Test for a Population Mean
38	25	F	15.4 – 15.5, 16.3	Interpreting P-Values; CIs and Hypothesis Tests
39	28	M	17.1 – 17.3	Confidence Interval and z-Test for Diff btwn Two Proportions
40	30	W	17.4 – 17.5	Confidence Interval and t-Test for Diff btwn Two Means
41	May 2	F	18.1 – 18.2	Paired Data and The Paired t-Test
42	5	M	18.3	Confidence Intervals for Matched Pairs
43	7	W	19.1	Chi-Square Goodness-of-Fit Test
44	9	F	19.4	Chi-Square Test of Independence
EXAM 3	**May 12 – 16**		**(Chpt 13 – 15, 17 – 19), Date/Time/Location TBA**	