Statistics for Business, STAT:1030:0AAA

Syllabus, Fall 2025

The University of Iowa
The College of Liberal Arts and Sciences

Course meeting time and place

Lectures:	M and W,	3:30-4:45, MacBride Hall Auditorium
Discussion Sessions:	T and Th,	Times and locations depend on section enrolled

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Instructor and Course Supervisor
Professor Joseph B. Lang

Phone
319-335-3129

Email
joseph-lang@uiowa.edu

Office location
271 SH

Student drop-in hours
Instructor: 10:30-12:00 M W, or by appointment
Discussion Instructors (TAs): See ICON, TA Info
Supplemental Instructor (SI): See ICON, Tutoring Info

Discussion Instructors (TAs)
For a list of TAs and their contact information, see ICON course homepage, TA Info.

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

Departmental Executive Officer (DEO)/Department Chair
Professor Kung-Sik Chan

Email
kung-sik-chan@uiowa.edu

Textbooks/Tools/Materials

The *required textbook* for this course is: *"Statistical and Probabilistic Reasoning for Business,"* Lang, 2025, which is freely available on the course ICON site.

The *recommended (not required) textbook* for this course is: "*Business Statistics*," 4th edn, Sharpe, De Veaux, and Velleman, Pearson, 2023, ISBN-13: 9780137897629 , https://www.pearson.com/en-us/subject-catalog/p/business-statistics/P200000006345/9780137897629 (rental price is about $60 for 6 mos.).

See the Appendix of this syllabus for other supplementary texts and popular press books.

The *required tools* are: pen[cil]; notebook; scientific calculator*; access to a computing device, ICON, and Excel (free in Office 365, UI); and a scan-to-pdf app or scanner.

*Note: The scientific calculator does not need to be graphical or have statistical functions, but it should at least include operators $+ - / \times, \sqrt{}, y^x$, and log. (e.g., TI 30X, Casio FX-300, Sharp EL-501 variants would suffice--cost around $10-$20. Try googling, "scientific calculators bulk" for some very cheap options. Most financial calculators will work, too.)

Almost all the material for this course will be available on the course ICON site.

Course ICON site

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

Course Administrative Home College

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

Drop Deadline for this Course

You may drop an individual course before the drop 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. To discuss how dropping (or staying in) a course might affect your academic goals, please contact your Academic Advisor. 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 CLAS courses here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

Description of Course

This is a one-semester undergraduate course in business statistics. Lectures will introduce the student to statistical and probabilistic reasoning and will cover introductory topics in descriptive and inferential statistics, with emphasis on business applications (see the Appendix). Discussions will support lecture material and include a weekly computer lab where Excel will be used for data analyses, visualization, and simulation. The material is presented at a level that should be comfortable to a first-year undergraduate student who has successfully completed high school algebra.
This is an approved Quantitative and Formal Reasoning General Education course.

Learning Outcomes

The successful student will leave this course with a basic understanding of many fundamentally important ideas of statistical and probabilistic reasoning. For example, they will be able to: (i) explain statistical concepts, paradoxes, and fallacies to colleagues; (ii) explain the importance of the data production/selection method; (iii) use basic probability rules to measure uncertainty; (iv) carry out predictions, with uncertainty bounds, in the straight-line regression setting; (v) describe univariate and multivariate data, both graphically and numerically; (vi) understand how to describe statistical association and use it to improve prediction; and (vii) carry out a variety of statistical inference procedures, after deeming them applicable. They will also be comfortable using Excel to carry out a variety of descriptive and inferential tasks and they will understand how Monte Carlo simulation can be useful for making inferences…and checking answers. *Most importantly, the successful student will learn what questions can be asked (and how to frame them) to improve decision making and predictions when confronted with data and uncertainty*.

Course Organization

Lectures and Discussions

Lectures. Attendance is required. The 75-minute in-person meetings on M and W will be used to introduce important concepts and questions, to give a running summary of the material, and to work through examples. We will cover most of the topics from Chapters 1-13 in the online textbook; see the Appendix for an outline of these topics. Students will be expected to come prepared and to participate in the worked examples and engagement activities. To be better prepared for lectures, students are strongly encouraged to look over the relevant material before class. The "engagement activities" and "skills building" exercises (see below) will serve as a guide to where we are, and will be, in the material.

Discussion Section. Attendance is required. The 50-minute in-person meetings on T and Th will be used to work through examples and practice problems related to the lecture material and skills building exercises. These sessions will also include engagement activities. On one of T or Th, depending on the section of your enrollment,

discussion will be held in the Myer's Computing Lab in 41 SH. Among other things, in this lab, discussion instructors will help students with the computing aspects of the course. We will primarily use the spreadsheet program Excel* to create graphical and numerical summaries of data and to carry out Monte Carlo simulations and basic statistical inferences.

*Note: Excel (https://en.wikipedia.org/wiki/Microsoft_Excel) is part of the Microsoft Office suite and is available in all the ITC labs on campus, including the Myers Computing Lab (41 SH).

ABC Work

All work in this class can be classified as one of the following three types: Engagement **A**ctivity, Skills **B**uilding, and Skills **C**heck; that is, **A**, **B**, or **C** work.

A. Engagement Activities (A work). Engagement activities will be carried out or assigned regularly (tentatively, around 16-24 over the semester) and will be handed in directly in discussion or lecture, or they will be electronically submitted to ICON. These activities take a variety of forms, including class participation, in-class teamwork, short summaries of lectures and discussions, computing work, and self-created exercises with solutions. In-class engagement activities will not be pre-announced. See the Assignments section of ICON for the out-of-class activities that will be submitted to ICON (typically on Fridays by 11:59pm).

Each piece of A work will generally be worth 2 points. Many will be scored using a hybrid completeness-accuracy scoring method. If an A piece includes "starred*" parts, these parts will be marked for accuracy and possible scores on this work are 0, 1, 1.7, and 2.

Your lowest 3 activity (A) scores will be dropped without penalty. There are no make-ups for engagement activities. If you must miss one for any reason, this will be a score that is dropped. This covid-era drop/no-make-up policy is in place to cover both unexcused and excused absences.

B. Skills Building (B work). To build the skills necessary to succeed in this course and then later in the workplace, skills building exercises will be assigned regularly (tentatively, around 3-6 over the semester). Your solution sets will be submitted to ICON, in a single pdf file. Details will be posted to the Assignments section of ICON. Due dates will typically be Fridays, at 11:59pm.

Each piece of B work will generally be worth 10 points. Scoring on B work will be accuracy based, with the possibility of partial credit.

Note: Much of your A and B work will be submitted to ICON; each submission must be formatted as a **single PDF file.** For those without scanners, there are free apps available for sequentially taking pictures of multiple pages and combining them into a single PDF file—the instructor has had some success with the iOS version of the free *Adobe Scan* app. It is your responsibility to make sure your ICON submission is complete and easily readable.

C. Skills Checks (C work). There will be three in-person Skills Checks over the semester (Wed, 6:30pm-8:30pm, Oct 1; Wed, 6:30-8:30pm, Nov 5; and finals week Dec 15-19, TBD). Skills Checks will be based on lecture and discussion material, and on engagement activities, skills building exercises, and practice problems. They are designed to emphasize timely reflection and are closed book. Details will be posted on ICON.

Each piece of C work will be worth 20 points. Scoring on C work will be accuracy based, with the possibility of partial credit.

Your highest, median, and lowest C score will be worth 30%, 20%, and 10% of the course score, respectively.

Calendar of Assignments and Skills Checks: For Planning Purposes…

Friday Work: You should plan to submit to ICON a piece of A or B work every Friday by 11:59pm. See the Assignments page in ICON for updates and exceptions.

Skills Checks: Skills Check 1 is scheduled for Wednesday, 6:30-8:30pm, Oct 1. And Skills Check 2 is scheduled for Wednesday, 6:30-8:30pm, Nov 5. The locations are to be announced. The final 2-hour, in-person Skills Check 3 will be given during finals week (Dec 15-19; Date, time, and location TBD).

Date and Time of the Final Exam (Skills Check 3)

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 the 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 scheduled for the same day (see the policy here).

Course Pace (Approximate)

Ch 1-4: Intro, Descriptive Stats (Univariate, Bivariate, and Regression) Weeks 1-5
Skills Check #1: W, 6:30pm, Oct 1

Ch 5-9: Data Production, Linking Data to Inference Targets,
Probability and Process Distributions, Named Distributions,
Approximating Process Distributions Weeks 6-9
Skills Check #2: W, 6:30pm, Nov 5

Ch 10-13: Statistical Inference, Fallacies and Paradoxes Weeks 10-15
Skills Check #3: TBD Dec 15-19

Course Score and Components for Evaluation

Your final course score S will be computed as

$$S = 0.25\,A + 0.15\,B + 0.30\,C_{(3)} + 0.20\,C_{(2)} + 0.10\,C_{(1)},$$

where $A =$ % credit on Engagement **A**ctivity work, $B =$ % credit on Skills **B**uilding work, and $C_{(3)} \geq C_{(2)} \geq C_{(1)}$ are the highest, median, and lowest of your three Skills **C**heck percentage (%) scores. This scoring scheme dramatically down-weights (i.e., is forgiving of) a low skills check score! See also the engagement activity section above for low-score dropping information.

As an example, suppose Lou received a score of 92% on her Engagement **A**ctivity work, 85% on her Skills **B**uilding work, and received Skills **C**heck percentage scores of 87%, 28%, and 95%. Because her highest, median, and lowest skills check scores are $C_{(3)} = 95\%$, $C_{(2)} = 87\%$, and $C_{(1)} = 28\%$, Lou's final score is

$$S = 0.25(92) + 0.15(85) + 0.30(95) + 0.20(87) + 0.10(28) = 84.45.$$

Grading System

Letter grades (including +'s and −'s) will be based on your S score and awarded according to a 90-80-70-60 schedule. For example, if $S \geq 90$, then a grade of 'A-' or better will be awarded. These are guaranteed cutoffs, so it is possible, but unlikely, that everyone receives an 'A.' As a rule, 'A+' grades will not be awarded in this class, except in very special circumstances.

With this grading system you are NOT "graded on a curve," so you are not competing with fellow students. Therefore, you are not penalized for working together on engagement activities and skills building exercises (unless instructed otherwise) to better understand concepts. Indeed, helping fellow students with the material is a great way to learn.

Miscellaneous Help and Resources for this Course

Help Outside of Class

- TA Student Drop-In Hours: See ICON for TA information.
- Instructor Student Drop-In Hours: See top of this syllabus.
- Statistics Tutorial Lab: There is a free statistics tutorial lab (1113 Red, Library Commons, First Floor, Main Library) for students in this course. During available times, a graduate student will be present to assist you. Hours for the lab can be found at https://www.stat.uiowa.edu/resources/tutoring.
- A list of paid private tutors can be found at https://www.stat.uiowa.edu/resources/tutoring as well.

- Supplemental Instruction (SI): This course has SI available. SI is an excellent peer facilitated, interactive group study session designed to not only help you learn the material, but also how to learn. See ICON for SI information or go to https://tutor.uiowa.edu/resources/supplemental-instruction-si

Help with Excel

- https://support.microsoft.com/en-us/excel or google any topic for video help

Scanning Apps (for creating images and combining them into a single PDF file)

- The iOS version of the free *Adobe Scan* app seems to work reasonably well.
- CamScanner (https://www.camscanner.com/) is another option.

Course-Specific Guidelines and Policies

Attendance. Attendance is required. Students must attend all lectures and discussion sessions. Just as in the workplace, attendance ("being there") is a critical predictor of success. There will be announced and unannounced Engagement Activities in both lecture and discussion. If you have questions about these expectations, please see your discussion instructor (TA).

Learning Environment. Non-course use of cell phones or any other electronic devices during lectures and discussions is **not permitted**. Take advantage of being in a distraction-free, learning environment. Immerse yourself, challenge yourself, focus, and enjoy the learning process.

Announcements, etc. Announcements, assignments, and supplementary material will be posted to ICON. You should check the course ICON site daily for announcements and updates.

Stay Caught Up. It is vitally important that you are self-disciplined enough to stay caught up. You should take note of the due dates of all ABC work and make sure to read and view the online text at least up to that point.

Effort Expectations. Effort expectations align with the home college's guideline: "for each semester hour of class time, around two hours per week of outside homework and class preparation should be completed by the average student." For example, in a 4-semester-hour course, standard out-of-class effort is 8 hours. Of course, you need to keep in mind that the '8 hours per week' is an average taken over the weeks in the semester. It is also an average taken over a diverse collection of students and courses. Thus, effort amounts will vary from week to week and from student to student. It is fair to say, however, that the more effort you put in, the more you will get out of the course.

Online Help Policy. You may not submit any question to, or use any answer from, a site (e.g., Chegg) that has non-classmate humans responding.

Artificial Intelligence (AI). Use of generative AI, e.g., ChatGPT, is allowed on A and B work because no human directly responds.

Working Together. Unless instructed otherwise, you may work together with another classmate on the Engagement Activities and Skills Building exercises. *However, you must write up your own solutions, in your own words*. If you are personally asked to write up your own solutions, but then subsequently turn in material that is obviously in the same words as someone else, the work will be considered plagiarized.

Plagiarism, cheating, and use of disallowed online help (see above) will be dealt with according to the policies of the College of Liberal Arts and Sciences and the University (see additional information on Academic Honesty and Misconduct below).

Late Work. Late submissions of any Skills Building (B) work will be penalized by 50% each 24-hour period, for 5 days. After 5 days, no credit can be received on a Skills Building set. For example, if you scored a 7.6 out of 10 on a Skills Building exercise set, but submitted it one hour late, you would receive a score of 3.8 out of 10; and if you submitted it 25 hours late, you would receive a score of 1.9 out of 10. Late Skills Checks (C work) and Engagement Activities (A) are not allowed.

Questions about Graded Work. Questions about grading *must be asked within one week* of the graded work's return. Reach out directly to your discussion instructor (TA) with any questions.

University and College Policies and Support

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.

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 DEO (Chair) of the department, school or program offering the course. Sometimes students will be referred to the department or program's Director of Undergraduate Studies (DUS) or Director of Graduate Studies (DGS).

Undergraduate students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS Graduate Affairs Manager when additional support is needed.

Absences and Accommodations

Absences, etc. See https://provost.uiowa.edu/student-course-policies for University policies on absences. This site also includes University policies on Free Speech and Expression, Non-Discrimination, Accommodations for Students with Disabilities, Classroom Expectations, and Class Recordings.

Accommodations for Students with Disabilities.
The University is committed to providing an educational experience that is accessible to all students. 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 to the student. **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. See also https://provost.uiowa.edu/student-course-policies .

Students are encouraged to talk to their instructor as soon as possible to discuss accommodations they may need related to disabilities, religious holy days, military service, etc.

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the college's standards of academic honesty. Undergraduate academic misconduct must be reported by instructors to CLAS according to these procedures. Graduate academic misconduct must be reported to the Graduate College according to Section F of the Graduate College Manual. See Course-Specific Guidelines and Policies above for more information about Academic Honesty and Misconduct.

Student Support Resources and Related Policies

Academic Support for this Course
See the "Miscellaneous Help and Resources" section above for information on drop-in student hours and other academic support resources.

Mental Health
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.

Basic Needs and Student Support

It can be difficult to maintain focus and be present if you are experiencing challenges with meeting basic needs or navigating personal crisis situations. The Office of the Dean of Students can help. Contact us for one-on-one support, identifying options, and to locate and access basic needs resources (such as food, rent, childcare, etc.).

Student Care and Assistance
132 IMU
dos-assistance@uiowa.edu
319-335-1162

Basic Needs info:

- Food Pantry at Iowa
- Clothing Closet
- Basic Needs and Support Resources

Sexual Harassment/Sexual Misconduct and Supportive Measures

The University of Iowa prohibits all forms of sexual harassment, sexual misconduct, and related retaliation. The Policy on Sexual Harassment and Sexual Misconduct governs actions by students, faculty, staff and visitors. Incidents of sexual harassment or sexual misconduct can be reported to the Office of Civil Rights Compliance or to the Department of Campus Safety. Students impacted by sexual harassment or sexual misconduct may be eligible for academic supportive measures and can learn more by contacting the Office of Civil Rights Compliance. Information about confidential resources and videos explaining these resources can be found on the Office of Civil Rights Compliance website.

Conflict Resolution

The Office of the Ombudsperson is a confidential, impartial, informal, and independent resource for any member of the university community with a problem or concern. The Office of the Ombudsperson offers a safe place to discuss conflicts or concerns. Students are encouraged to reach out for assistance. The office will brainstorm with students to help identify options, answer any questions, and provide referrals to other offices as appropriate. More information about the Office of the Ombudsperson, including how to schedule an appointment, can be found at ombudsperson.org.uiowa.edu.

APPENDIX: STAT:1030 Course Topics and Supplementary Books

Textbook "Statistical and Probabilistic Reasoning for Business" Topics

Chapter 1 Introduction (and Overture)

Goals of Business Statistics
The "What"-"So What"-"Now What" Cycle
Overview of Statistical and Probabilistic Reasoning
Variables (aka Features) and Variable Types
Data, Data Set, Data Base, Data Centers
Sample, Population, and Process (aka Probability) Distributions
Statistics vs. Population and Process Parameters
Descriptive vs. Inferential Statistics
Data Production (All Data are Not Created Equal)
Calculators: Probability and More
Comparing Values (e.g., percent change, CAGR, Present Value, inflation-adjustment)
OPTIONAL: Casino Games and Sports Betting

Chapter 2 Descriptive Statistics: Univariate Distributions

Graphical Descriptions of Qualitative and Quantitative Data
Numerical Descriptions
Relative Standing including Percentile Rank and Z Scores
Comparing Univariate Distributions

Chapter 3 Descriptive Statistics: Bivariate Distributions

Joint, Marginal, and Conditional Sample Distributions
Association, Correlation, and Causation (Definitions for Qual and Quant Variables)
Two-Way Tables and Scatterplots
Measures of Association including Rate Ratio (Relative Risk), Lift, and Correlation
2+2+1 Statistics for Bell-Bell-Linear Bivariate Distributions
Summaries of Linear Combination Data
Why Association is Useful

Chapter 4 Descriptive Statistics: Regression for Bivariate Description and Prediction

Least Squares (LSQ) Line: Computations and Interpretations
Associative, not Causal, Interpretation of Slope and Predictions
Point Prediction and Residual-Based Eye-Balled Prediction Intervals
Regression to the Mean and the Regression Fallacy

Chapter 5 Data Production

Population Sampling Methods (Probability vs. Non-Probability)
Process Sampling Methods (Replication and Sequential)
Two-Stage Selection Sampling and Selection Bias
Data Snooper's Mantra, Confirmation Bias, and Propaganda Bias
Observational Study vs. Randomized Designed Experiment
Other Study Types

Chapter 6 Linking Data to Inference Targets

The Fundamental Theorem of Statistics (FTS)
The Law of Large Numbers (LLN)
Empirical Interpretations of Process Parameters

Chapter 7 Process (aka Probability) Distributions

The 7 Properties of Probability
Bayes Rule
Univariate and Multivariate Process Distributions,
including Joint, Marginal, and Conditional Processes
Practically-Speaking, Why Study Multivariate (and Univariate) Processes?
Summaries of Univariate Processes
Summaries of Bivariate and Multivariate Processes
Summaries of Linear Combination Processes
Monte Carlo Simulation for Approximating an Investment Process Distribution

Chapter 8 Named Process Distributions

Discrete: Binomial, *Time Permitting*: Geometric, and Poisson Distributions
Continuous: Uniform, Normal, Student's t, Exponential, Gamma, and Chi-Squared Distributions
Probability Calculators (online and in Excel)

Chapter 9 Approximating Process Distributions

The Language and Displays of Processes
Monte Carlo Simulation Approximations
Central Limit Theorem for Mean and Proportion, plus Normal Approx'n to Binomial
Standardized Mean and Proportion Approximations (StaMA and StaPA)
Studentized Mean and Proportion Approximations (StuMA and StuPA)
Student's t Distributions

Chapters 10-12 Statistical Inference (Confidence Intervals and Tests)

One-Sample Univariate Setting
t and Z procedures for a population or process mean μ;
Wald and Score procedures for a population proportion or probability p;
Chi-Squared Test of Goodness of Fit
Two-Sample Univariate Setting
Welch's and Student's Pooled t procedures for difference
bw two population or process means $\mu_1 - \mu_2$;
Wald and Score inference procedures for difference
bw two population proportions or probabilities $p_1 - p_2$
One-Sample Bivariate Setting
Paired-Difference t for difference bw two popn or process means $\mu_1 - \mu_2$;
Chi-Squared Test of Independence bw two discrete variables;
Normal Straight-Line Regression (estimation and prediction)

Chapter 13 Paradoxes and Fallacies

Association is not Causation
Multiple Testing and Publication Bias
Simpson's Paradox
Regression Fallacy
Switched Conditionals Fallacy
Time Permitting: Gambler's Fallacies, Statistical Testing and Estimation Fallacies, Sampling Fallacies and Data Snooping Problems

Chapter 14 Bootstrap *(time permitting)*

Chapter 15 Descriptive Statistics: Change *(partial coverage)*

Time Series, Percent Change, Annualized Percent Change (CAGR), Adjusting for Inflation using CPI, Exponential Model, Compound Interest, Doubling Time, Logarithmic Time Series, Monte Carlo Simulation Revisited, Quality Control, Control Charts

A Sample of Illustrative Examples ...

- *Utility of Time Series Plots for detecting change patterns and for prediction.*
- *Compound Interest, Present Value, Future Value, and CAGR*
- *Adjusting for Inflation with CPI*
- *Markup Rates and Profit Margins*
- *Market Basket Lift as a measure of association*
- *Portfolio Analysis and the Utility of Diversification*
- *Regression for improved prediction of actual (rather than projected) time to job completion.*
- *Size of Sales Force and Sales: On the negative consequences of an incorrect causal interpretation of regression results*
- *Beta Measure of Financial Risk. Regression for assessing sensitivity to overall market swings.*
- *Control Charts (time permitting)*
- *Predicting 10-Year Returns on Investment using Monte Carlo Simulation*
- *Table Waiting. You arrive at a restaurant only to find that you are 4th on the waiting list. How long will you wait? ... A Monte Carlo Simulation solution*
- *Safety Stock Analysis*
- *A realtor found that the LSQ line for predicting the sale price of a home (P) based on the number of toilet paper holders (H) is $P = 120000 + 70000\,H$. Unfortunately, if we add another toilet paper holder to a home, we canNOT expect the price to go up by $\$70000$!*
- *Drug A is better than B overall. But Drug B is better than A for females...AND for males. Huh?*
- *Overall, Airline A has a lower delay rate than Airline B. Sheila has her employees fly with Airline B because there is less chance of delay. Huh?*
- *The Problem with Ranking Hospitals, Awarding Bonuses, Choosing Airlines...(see Simpson's Paradox)*

- *Stock A had return that was 3 std deviations above average this year. The best prediction for its relative standing next year is NOT 3 std deviations above average. A better prediction is closer to average, by the Regression-to-the-Mean phenomenon.*
- *Is there an employee-of-the-month curse? A Sports-Illustrated-cover curse?*
- *Management notes that rewarding high-performing employees typically leads to poorer follow-up performances and punishing low-performing employees typically leads to better follow-up performances. True or False: These data clearly suggest that punishment works better than rewards (i.e., a stick is better than a carrot). False! (see the Regression Fallacy).*
- *A diagnostic test for a rare (1 in 1000) virus is 90% accurate. A randomly selected person tests positive. The chances this person has the virus is NOT 90%; it is only around 0.9%!*
- *Corporate leaders decide to use random drug testing because an inexpensive, 95%-accurate drug test has become available. If the prevalence of drug use by corporate employees is about 1 in 500 and a randomly selected employee tests positive for drug use, then what is the probability this employee actually did use drugs? Answer: The probability of use is just 3.67%, not anywhere near 95%!*

Supplementary (not required) Books

Besides the required online (ICON) textbook and the recommended textbook by Sharpe, De Veaux, and Velleman (2023), there are many other free online textbooks available; several include worked examples. For instance…

- https://www.stat.berkeley.edu/~stark/SticiGui/index.htm
- https://open.umn.edu/opentextbooks/textbooks/385
- https://textbookequity.org/Textbooks/introductorystatistics_Vol1.pdf
- https://openstax.org/details/books/introductory-statistics

Other non-free books that are very good include "*The Practice of Statistics for Business and Economics*," 4th edition, by Moore, McCabe, Alwan, and Craig, 2016, Macmillan; and "*Statistics: Concepts and Controversies*," 10th edition, by Moore and Notz, 2020, Macmillan.

There are also many entertaining and informative popular press books available, e.g., "*The Art of Statistics: How to Learn from Data*," by D. Spiegelhalter, 2021 (see a corresponding presentation at https://www.lse.ac.uk/Events/Events-Assets/PDF/2019/01-LT/20190327-Learning-from-Data.pdf); "*Partial Truths: How Fractions Distort Our Thinking*," by J.C. Zimring, 2024; see Prof Lang for more suggested reading.

---------- end of STAT:1030 Syllabus, Fall 2025 ----------

I hope you all have an enjoyable and rewarding semester. Good luck in all your courses.

–Professor Lang