Teaching Portfolio – Dipto Das

CONTENTS

1 SUMMARY OF TEACHING EXPERIENCE

Institution	Role	Courses (Term)
Note: Role in Blue color = Instructor of Record.		
University of Toronto	Course Instructor	CSC 300: Computer and Society
University of Colorado Boulder	Adjunct Professor	INFO 4609: User-Centered Design
	Assistant Teaching Professor	INFO 2301: Quantitative Reasoning INFO 1301: Statistics for Info Science
	Graduate Part-Time Instructor	INFO 4609: User-Centered Design INFO 1301: Statistics for Info Science
	Graduate Teaching Assistant	INFO 1301: Statistics for Info Science INFO 1201: Computational Reasoning INFO 1111: Understanding the World Through Data
Syracuse University	Teaching Practicum	IST 649: Human Interaction with Computers IST 421: Information Visualization IST 343: Data in Society IST 300: Digital Platforms
Missouri State University	Graduate Assistant	CSC 131: Computational Thinking CSC 130: The World of Computer Science
Dhaka International University	Lecturer	CSE 401+402: Compiler Design CSE 301+302: Algorithm Design and Analysis CSE 209: Computer Organization and Architecture

2 TEACHING PHILOSOPHY

As a first-generation student, I have found my teachers, mentors, and advisors to be constant sources of motivation and respect for teaching. While growing up, they guided and tutored me when my parents were unable to assist me with schoolwork or in making many academic decisions due to their unfamiliarity with the topics or contexts. I still remember my school teacher wading through waist-deep floodwater to reach my house and ensure I was keeping up with my studies during a time when a devastating flood shut the school down before a nationwide public exam. Having met such selfless souls throughout my academic life, I perceive teaching as a labor of love and view helping my students with the same dedication as a way to express my gratitude to my teachers.

Teaching Philosophy and Experience

As a teacher, my primary objectives are to provide students with both theoretical grounding and practical tools for critical thinking regarding the complex relationships among humans, data, and technology. My teaching philosophy is grounded in active learning methodologies and the principles of decolonizing educational environments. This involves reexamining curricula, teaching methods, and institutional practices, and actively incorporating diverse voices, perspectives, and cultural contexts by shaping an environment that fosters collaborative learning. I have put these commitments into practice through the courses I have taught before and during graduate school, as well as those I currently teach alongside my postdoctoral work, across institutions in the United States, Bangladesh, and Canada.

My commitment to accessible, practice-oriented teaching began during my early career as a **Lecturer** at Dhaka International University, where I taught courses, such as *Algorithm Design & Analysis*, *Computer Organization & Architecture*, and *Compiler Design*. In a developing economy context where many students lacked access to computing resources, I prioritized comprehensive textbooks and free/open-source tools that ran on minimal hardware. For example, I used the YACC (Yet-Another-C-Compiler) for hands-on work in compiler design, and the SPIM RISC (Reduced Instruction Set Computer) simulator to teach computer organization, enabling students to gain globally relevant skills without the need for expensive computing devices. I also emphasized industry-aligned practices to prepare them for professional careers. This experience underscored the value of pragmatic, accessible curricula–an approach I continue in North American classrooms with students from diverse socioeconomic backgrounds.

Earlier in my teaching career, during graduate school, I served as a **Teaching Assistant** (TA) at the University of Colorado Boulder (CU Boulder) and Missouri State University. Under course titles such as *Computational Reasoning* and *Computational Thinking*, I supported introductory programming classes where I helped students from computer and information science backgrounds build foundational programming skills in Python, covering both structured and object-oriented approaches. I emphasized the importance of good coding practices–such as following PEP 8 guidelines for readability, optimization, and maintainability–alongside technical competence. To accommodate students who learned at different paces, I held guided recitation sessions and offered office hours for one-on-one interactions. I also have experience with courses that connect technical skills with broader societal questions. As a TA for the *Understanding the World Through Data* course at CU Boulder, I guided students in analyzing interviews, surveys, and self-tracked data, and facilitated studio sessions that reinforced my commitment to practice-based learning.

I further enriched my pedagogical strength through **teaching practica** with senior faculty at Syracuse University, where I learned to integrate inclusive discussions, adaptive teaching, and curriculum design. In a graduate course on *Human Interaction with Computers*, I facilitated project-based learning by mentoring students as they implemented participatory design in semester-long projects, which strengthened my ability to scaffold complex, collaborative work. During the abrupt shift to remote learning at the onset of the COVID-19 pandemic, I guided undergraduates in *Data in Society* class through the transition by adapting materials for both synchronous and asynchronous formats and ensuring that varied access needs were met–an experience that sharpened my flexibility as an instructor. I also contributed to redesigning the *Digital Platforms* and *Information Visualization* courses by curating diverse academic/public-facing readings, developing coding assignments in the R language, and designing portfolio-oriented projects, thereby expanding my toolkit for building accessible and practice-oriented curricula.

At the University of Colorado Boulder, I built on these foundations as the **Instructor of Record** for multiple courses in roles like **Assistant Teaching Professor**, **Adjunct Professor**, and **Graduate Part-Time Instructor**. In the *Statistics*

for Information Science course, I redesigned lectures and assignments to balance theoretical grounding with hands-on analysis. Because students entered with varying levels of preparation–from first-time statistics learners to those with advanced coursework–I developed modular lectures, incorporated intuitive visuals, diverse datasets, and prepared tutorial videos for the tools used in the course. These changes, based on student feedback and learning surveys, created a more inclusive and accessible environment, while still holding students to high expectations. In this way, I put into practice my goal of making classes accessible to students with different levels of topical familiarity, study habits, and learning styles. To teach *User-Centered Design*, I curated readings across cognitive, organizational, and sociotechnical perspectives, deliberately integrating research and case studies from globally diverse contexts. I paired these readings with group projects that promoted collegiality and peer learning, alongside individual assignments that encouraged mastery of theory and method. In the *Quantitative Reasoning* class, I emphasized intuitive visuals, step-by-step analysis, and opportunities for collaborative problem-solving, ensuring that students could develop confidence and skills regardless of their prior knowledge. I have also **guest lectured** in various courses, such as *Race & Technology*, *Online Communities*, *Applied Machine Learning*, and *Ethical & Policy Dimensions of Information Technology* during my tenure there. Across these courses, I consistently drew on active learning practices and critical perspectives to help students connect technical skills with broader sociotechnical contexts. My teaching in these roles was recognized with an **Award of Excellence for Teaching** at CU Boulder and consistently **strong Faculty Course Questionnaire scores and comments**, reflecting its clarity, accessibility, and effectiveness.

Currently, as a postdoctoral fellow at the University of Toronto (UToronto), I have assisted in developing the syllabus of a graduate course on *Ethical Aspects of AI*. I have also been personally invited to serve as the **Course Instructor** for the *Computer and Society* class in Winter 2026. This large, discussion-intensive course, enrolling more than 300 undergraduates in two sections, will allow me to extend these strategies at scale: modularizing lectures to manage a large cohort and creating a space where students can critically reflect on the societal implications of technology.

Overall, I view the classroom as a space to share expertise and foster reflection, using inclusive and accessible curricula to prepare students to engage real-world challenges with critical, ethical, and professional responsibility.

Advising and Mentorship Experience

During my PhD and postdoctoral work, I have mentored *more than ten graduate and undergraduate students* at UToronto, CU Boulder, and through collaborations with other institutions. My mentees come from diverse academic and socioeconomic backgrounds, including historically underrepresented ethnic and cultural communities.

My advising includes hands-on guidance in research design, data collection, and writing, then gradually encouraging independent work as students gain confidence. I meet regularly with my mentees to assess their progress, address any challenges they may face, and provide constructive feedback, all while maintaining an accessible presence. I view mentorship as a form of collaboration, where I encourage student colleagues to pursue their own research questions while scaffolding their learning through structured feedback and discussions. This approach has led to my mentees *leading or co-authoring papers in reputed venues*, such as ACM CHI, CSCW, and COMPASS, including one that received a *Best Paper Honorable Mention at CHI*. Several others have advanced professionally by securing graduate opportunities and internships. Beyond these tangible outcomes, I foster a supportive culture by encouraging my mentees to participate in research discussions and academic service to prepare them for sustained scholarly involvement.

My mentorship philosophy is rooted in empathy and leading by example. I believe that effective mentoring requires attentiveness to students' personal and professional circumstances, especially during uncertain stages of research. By demonstrating ownership, responsibility, and enthusiasm for scholarly work, I aim to instill the same values in my mentees. Ultimately, I view mentorship as a process of empowerment–helping students see themselves not just as learners, but as knowledge producers and future leaders in computing research.

Teaching Interests

My teaching interests span **human–computer interaction (HCI)**, **algorithmic fairness**, and **human-centered data science**, alongside **core areas of computer and information science**. At the undergraduate level, I am prepared to teach foundational courses, such as *Introduction to Programming*, *Data Structures & Algorithms*, *Statistics*, *Database*,

HCI, *Machine Learning*, and *Natural Language Processing*. At the graduate level, I am enthusiastic about teaching *Human-Centered AI*, *Algorithmic Fairness*, *AI Ethics & Policy*, *Experimental Design*, *User Experience Research Methods*, *Data Analytics*, *Computational Social Science*, and *ICT for Development*. I am also eager to contribute to curriculum development by refining existing courses and designing advanced electives that strengthen technical competence while fostering critical engagement with the sociocultural, ethical, and responsible dimensions of computing, integrating insights from my interdisciplinary research to prepare students for contemporary sociotechnical challenges.

3 SAMPLE SYLLABI

In the pages that follow, I have attached three syllabi from courses I have taught at the University of Colorado Boulder as the *Instructor of Record*:

- **INFO 4609:** User-Centered Design (Fall 2025) (See page 5)
- **INFO 2301:** Quantitative Reasoning (Spring 2025) (See page 10)
- **INFO 1301:** Statistics for Information Science (Spring 2023) (See page 13)

These three sample syllabi show my approach to scaffolding learning outcomes, aligning assessments, and communicating expectations across levels. Each syllabus foregrounds inclusive policies and transparent grading. For conciseness, I have removed non-essential details such as class schedules, office hours, TA/grader information, and university-wide course policy statements.

3.1 INFO 4609 User-Centered Design Syllabus

INFO 4609 User-Centered Design
Fall 2025

Course Description
This course surveys the theoretical and practical foundations of human-computer interaction and user-centered design. Students learn theories of interaction (including cognitive, organizational, collaborative, and task-based approaches), user interface design techniques, design guidelines, and usability testing in the context of developing technology. Course content is explored through a variety of interfaces (desktop, mobile, touch, vision, audio, etc.) and contexts (personal, organizational, cross-cultural, etc.).

Course Goals
- Examine and discuss the theoretical foundations of user-centered design, such as how our designs are political and embedded with power issues.
- Engage in techniques and tools of User-Centered Design such as user research, ideating, prototyping, and testing.
- Create and share a final project that demonstrates the exploration and application of ideas from the course and in response to peer, instructor, and community feedback.

What You'll Learn
After successfully completing this course, students will:
- Analytically interpret the interplay between human beings, tasks, technologies, and contexts.
- Gather and understand user requirements.
- Apply user-centered design (UCD) and human-computer interaction (HCI) principles, methods, techniques, and guidelines for human-centered technology design and development.
- Conduct evaluations and user studies.

Course Materials
We will read chapters from a few books and research papers. Dipto will upload the readings to Canvas.

Grading Components

Participation	10%
Weekly Reading Quizzes	10%
Module Reading Reflections	40%
Course Project	40%
	100%

How to Be Successful in INFO 4609

Come to class having read well and worked on your project diligently. Attendance in this course is required. Much of what you learn about will occur in class, and much of what you learn how to do will occur in class. You will practice skills in class. Other activities cannot replace this practice and participation. Classes will be structured to balance theory and application. On Tuesdays, we will focus on lectures and discussions of the assigned readings to build a theoretical foundation. Thursdays will be devoted to applied in-class activities such as method practice, critique, prototyping, and related project work.

Navigate the course in Canvas: https://canvas.colorado.edu/courses/126752

Use modules. Within each module, you'll find everything you need for that instructional unit. This will help you anticipate what's going to happen and understand the big picture better than if you use the assignments function. Use the Canvas calendar. Note that you can select which of your classes you want to look at. Scroll down on the Canvas landing page to see the course summary calendar in list format.

Commit to learning and understanding approaches to user-centered design. Do the reading. Come to class to discuss the readings and share your progress on your projects with your group members and me each week. Make sense of the data collection, analysis, and prototyping you're doing. Communicate with your group members. Come to office hours.

Participation and Attendance

Attendance in this course is required, and your participation grade will be based on the following factors:

- Leaving comments and feedback, and asking questions about other students' projects
- Practice active listening – be attentive and be engaged
- Ask questions – there are no dumb questions, but don't be afraid to challenge
- Comment, build on, or clarify others' contributions
- Keeping the camera on during the remote class
- Maintain professional interactions with group partners that include showing up to meetings on time, sharing project feedback, and following through on shared commitments.

Late Policy

One student can submit at most two assignments late, subject to a 10% deduction per day. After that, no late submissions will be accepted. There is no opportunity to submit project milestones or the final report late.

Course Project

As part of this course, students will form groups of 4-5 to engage in the user-centered design cycle, which includes user research, scenarios, ideation, prototyping, and evaluation. Students can choose the domain area of their interest. The course project will have the following milestones:

- Proposal and team composition (5%)
- User requirements (7.5%)
- Prototypes (7.5%)
- Evaluation (7.5%)

- Final report (12.5%)

Each milestone builds on the previous milestones and will cumulatively move your team towards your Final Paper and Showcase. The Final Paper will be about 5000 words in the ACM primary template (https://www.acm.org/publications/proceedings-template) and consist of your documentation of each step in the UCD process. The Showcase will be a 5-10-minute presentation in class during the final week.

Course Project Paper instead of Final Exam

There is no Final Exam! The final project paper submission is due on December 9, before 7 pm.

Administrative Information

By CMCI policy, incompletes can only be assigned when a student has successfully completed a significant portion of the work in the course and when unforeseen events interrupt their ability to complete the work. An incomplete cannot be given to avoid a low grade in the course. The last day to withdraw from a class is October 28, 2025.

Course Schedule

Module 1: Foundations

1. **Week 1**
    a. *Thursday (8/21):* Course intro, syllabus, icebreaker activity (bad design examples).
2. **Week 2**
    a. *Readings:* Norman, Design of Everyday Things, Ch. 1 and 2
    b. *Tuesday (8/26):* Lecture on Norman's chapter 1, in-class activity: critique everyday objects using Norman's principles
    c. *Thursday (8/28):* Lecture on Norman's chapter 2, Hands-on: redesign a common object (door, microwave, website) and discussion on project outline.
3. **Week 3**
    a. *Reading:* Norman, Design of Everyday Things, Ch. 3.
    b. *Tuesday (9/2):* Lecture on Norman's chapter, in-class activity: reflect on the cognition and context in design.
    c. *Thursday (9/4):* Hands-on: cognitive processing and natural mapping exercise (heuristic evaluation of an app).
    d. *Assignment (9/9):* Module Reading Reflection 1

Module 2: UCD Process

4. **Week 4**
    a. *Reading:*
        i. Spinuzzi, C. (2005). The methodology of participatory design. Technical communication, 52(2), 163-174.
        ii. *Extra:* Fogg, B. J. (2009, April). A behavior model for persuasive design. In Proceedings of the 4th International Conference on Persuasive Technology (pp. 1-7).

   b. *Tuesday (9/9):* Discussion on the overview of different design paradigms with a focus on participatory design.
   c. *Thursday (9/11):* **no class**, time to form work on the project proposal.
   d. *Project (9/12):* Proposal and team composition
5. **Week 5**
   a. *Reading:*
      i. Lareau, Listening to People: A Practical Guide to Interviewing, Participant Observation, Data Analysis, and Writing It All Up, Ch. 4 (assigned) and Ch. 5 (extra).
      ii. https://www.nngroup.com/articles/wizard-of-oz/
   b. *Tuesday (9/16):* Discussion of interviews as a way to know.
   c. *Thursday (9/18):* Activity: getting started with the interview materials for the proposed project, answering questions, and pair interviewing in class as pilots
   d. *Project (9/30):* User requirements
6. **Week 6**
   a. *Reading:*
      i. Buxton, B. (2010). Sketching user experiences: getting the design right and the right design, Ch. 12-15. (don't be intimidated, these are really short chapters)
      ii. https://medium.com/digital-experience-design/a-guide-to-paper-prototyping-testing-for-web-interfaces-49e542ba765f
   b. *Thursday (9/23):* Discussion on sketching interface vs. user experience and prototyping.
   c. *Thursday (9/25):* Activity: sketching & storyboarding workshop (Miro prototyping instead of paper prototyping with peers).
   d. *Assignment (9/30):* Reading Reflection 2
7. **Week 7**
   a. Reading: No reading, some video tutorials might be added later.
   b. *Tuesday (9/30):* Figma Bootcamp
   c. *Thursday (10/2):* Activity: getting started with developing high-fidelity prototypes using Figma for projects.
8. **Week 8**
   a. Mid-Semester Check-In.
   b. *Tuesday (10/7):* No new reading. Project progress check and catch up.
   c. *Thursday (10/9):* Mid-reading day (no class)
   d. *Project (10/14):* Prototypes

Module 3: Evaluation

9. **Week 9**
   a. *Reading:*
      i. Ko, A., Design Methods, Ch. 9.
      ii. Brooke, J. (1996). Sus: a "quick and dirty" usability. Usability evaluation in industry, 189(3), 189-194.
   b. *Tuesday (10/14):* Discussion on empirical evaluation of usability.
   c. *Thursday (10/16):* getting started with quantitative usability tests in class.
10. **Week 10**

a. *Reading:*
   i. Ko, A., Design Methods, Ch. 10.
   ii. https://www.interaction-design.org/literature/article/creating-personas-from-user-research-results
b. *Tuesday (10/21):* Discussion on analytical evaluation of usability.
c. *Thursday (10/23):* getting started with creating personas in groups.

11. Week 11
a. *Reading:* Dell, N., Vaidyanathan, V., Medhi, I., Cutrell, E., & Thies, W. (2012, May). "Yours is better!" Participant response bias in HCI. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (pp. 1321-1330).
b. *Tuesday (10/28):* Discussion on evaluation bias.
c. *Thursday (10/30):* group-wise updates on projects
d. *Assignment (11/4):* Reading Reflection 3
e. *Project (11/11):* Evaluation

Module 4: Critical UCD & Frontiers

12. Week 12
a. *Reading:* Winner, Do Artifacts Have Politics?
b. *Tuesday (11/4):* Lecture on Winner's paper and pick different artifacts and reflect on what kind of politics those have.
c. *Thursday (11/6):* Discuss what kind of politics the projects you are working on have.

13. Week 13
a. *Reading:* Greenberg, S., & Buxton, B. (2008, April). Usability evaluation considered harmful (some of the time). Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 111-120).
b. *Tuesday (11/11):* Lecture on Greenberg article and critique the analytical and empirical evaluation methods.
c. *Thursday (11/13):* Reflect on the possible shortcomings of evaluation approaches in your projects.

14. Week 14
a. *Reading:* Weiser, M. (1999). The computer for the 21st century. ACM SIGMOBILE mobile computing and communications review, 3(3), 3-11.
b. *Tuesday (11/18):* Lecture on Weiser's paper and discuss examples.
c. *Thursday (11/20):* Speculative design activity and future interfaces for your projects.
d. Assignment (11/20): Reading Reflection 4

15. Week 15: Fall break / Thanksgiving (no class).

16. Week 16
a. *Tuesday (12/2):* Final catch-up on projects.
b. *Thursday (12/4):* Final project presentations.
c. *Project (12/9):* Final report submission

3.2 INFO 2301 Quantitative Thinking Syllabus

INFO 2301: Quantitative Reasoning
Spring 2025

Course Description:
Introduces methods for quantifying and analyzing different data types, covering foundational concepts in discrete mathematics, probability, and predictive modeling, along with complementary computational skills to apply these concepts to real problems. Covers counting and combinatorics, logic, set theory, introductory probability, common probability distributions, regression, and model validation. Requires demonstrated proficiency with introductory computer programming.

Cumulative Instruction:
This course covers foundational mathematical concepts you repeatedly use when working with data. To help you master the material, the course will be taught cumulatively. That is, future concepts will be built upon past concepts we studied earlier in class. Once you miss a class, it won't be easy to make up. Please ask questions if you do not understand a concept because it will be challenging to build upon concepts you don't understand.

Textbook:
You don't have to purchase a textbook for this course. We will provide everything you need to succeed. However, if you wish to delve in-depth and go beyond the fundamentals, you may choose from numerous books and online resources available on discrete mathematics.

Topic Schedule:

Module One: Fundamentals	
Week 1	• Motivation • Overview of the course (syllabus) • JypyterHub
Week 2	• Logic • Introduction to unittest and LaTeX
Week 3	• Sets • Functions
Week 4	• Scalars and vectors • Matrices
Week 5	• Exam 1
Module Two: Statistics and Probability	
Week 6	• Statistics • Probability distribution
Week 7	• Conditional probability
Week 8	• Expected value

Week 9	• Bayes Rule
Week 10	• Exam 2
Module Three: Combinatorics, Distributions, and Regression	
Week 11	• Permutations and combinations
Week 12	• Binomial Distribution
Week 13	• Normal Distribution
Week 14	• Regression and correlation
Week 15	• Final Exam

Course Objective and Outcomes:
This course aims to introduce fundamental methods for quantitative reasoning about data. It covers foundational concepts in data science and emphasizes complementary computational skills to apply these mathematical concepts to real problems. Upon completing this course, students will:

- Understand fundamental concepts such as logic, Sets, Functions and Scalars, Vectors, and Matrices for reasoning quantitatively about data
- Apply descriptive and inferential statistics techniques to reason about data
- Predict the likelihood of future events
- Using combinatorics for enumeration, combination, and permutation of sets of elements
- Using probability distributions to describe possible values and likelihoods that a random variable can take with a given range
- Creating applications that apply computational skills to solving real-world data analysis and solutions

Every class is unique, comprising students with varying degrees of expertise and knowledge of subject matter. One of my challenges is establishing a common baseline for the class. I prepare my lessons to meet the needs of the common baseline of the class. That can sometimes lead to students feeling they need to be sufficiently challenged. In that case, please speak with me promptly, and I will give you more challenging assignments for extra credit. However, you must complete the class assignments before requesting an extra credit assignment. You will receive no credit for the extra credit assignment, even if it is perfect, but you need to complete the class assignment first. Under no circumstances can an extra credit assignment be used to improve your grade. Extra credit assignments are only meant to provide a challenging assignment to those students who feel the regular assignments could be made more challenging.

Assignments and Grading:
Assignments will have a due date and points associated with them posted in Canvas. If you miss a due date, the points associated with the assignment are lost forever. However, at the end of the semester, we will drop one quiz and one reading assignment with the lowest score from the final grade.

Reading quizzes will require you to answer questions through Canvas. Passwords will protect quizzes and may only be taken during class time. Once you miss the due date of a reading quiz, the points associated with that will be lost. **You cannot make up for that reading quiz.** Due dates for Projects/Exams are final. The university sets the Final Exam's due date, which is absolute. Exceptions will be made only in exceptional circumstances.

Late Policy
Homework assignments are the only type of submission that can be submitted late, but you will lose 10 points of the grade every day after the due date (capped at 50 points).

Grade Distribution:

Attendance	10%
Required quizzes	10%
Homework assignments	20%
Exam 1	20%
Exam 2	20%
Final exam	20%

Attendance:
This course meets twice a week and is designed to teach core concepts through a mix of in-class lectures, readings, discussions, quizzes, homework assignments, projects, and exams. This is an in-person class. Attendance is mandatory, from my (instructor's) perspective. I will take attendance at the beginning of the second week through CU Clickers/iClickers, but there will be no points associated with attendance. I urge you to attend all classes. As an adult university student, it is your choice whether to attend class or not. You are responsible for all material covered during your absence and the consequences thereof. I respect your choice of whether to attend a class or not.

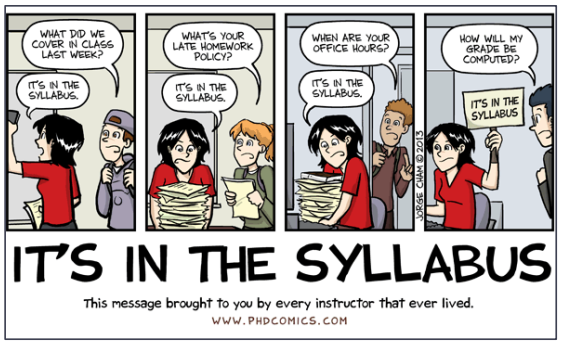
If you miss an assignment (such as a quiz) due to an absence, the "Assignment and Grading Policy" will apply. All information about this class will be posted on the course page in Canvas. If you miss a class, please catch up by reviewing the material posted in Canvas. You are responsible for all material covered during your absence. There is no need to email me about your absence. Again, it is your choice to attend class or not.

Please don't fall behind to succeed in this class!

3.3 INFO 1301 Statistics for Information Science Syllabus

INFO 1301 Statistics for Information Science Syllabus

Spring 2023



Last updated: March 10, 2023

What You'll Learn

After successfully completing this course, students will:

- Organize and understand types of data in statistical analysis;
- Use Microsoft Excel to summarize data numerically and visually, and to perform data analysis;
- Identify limitations in data collection and other sources of statistical bias and noise, and determine their implications for claims and decisions based on statistical findings;
- Investigate relationships among variables and groups by making statistical inferences;
- Interpret findings and communicate them clearly; and
- Be critical consumers of others' analyses.

Course Materials

Free!

Required Texts

- Diez, D. M., Barr, C. D., & Çetinkaya-Rundel, M. (2019). OpenIntro Statistics—Fourth Edition. Download from Canvas as PDF *preferred* (or from https://leanpub.com/os -- follow instructions to set price to zero)
- Other readings in Canvas
- Excel Easy a website with a lot of tutorials so you can quickly learn to use Excel

Software and Hardware

- Microsoft Excel download to your Windows or Mac, free to CU students. Follow instructions at Office 365 Software page. Log in using your Identikey.
- Please bring a laptop or comparable device to class on Fridays (your phone or average tablet won't work). If you don't have a laptop, let's talk.

How to Be Successful in INFO 1301

Come to class, don't leave town early

Attendance in this course is required. Much of what you *learn about* will occur in class and much of what you *learn how to do* will occur in class. You will practice skills in class. This practice cannot be replaced by other activities. Of course, things happen beyond our control. Two missed classes will be dropped from your total. Please plan to be in class. Class will be held Friday, November 18.

Final exam: Wednesday, May 10, 1:30-4 pm. in class. Do not schedule travel to leave town before the exam.

Know the flow

Except for weeks when we have exams, the class flow is as shown in this table.

Monday	Tuesday	Wednesday	Friday
			
▪ Read required materials ▪ Ask questions about upcoming assignments ▪ In class: Lecture, Q&A	▪ Homework due by 12:20 pm	▪ Read required materials ▪ Quiz (untimed) due by 12:20 pm ▪ In class: Lecture, Q&A	▪ Prepare: tutorials, review ▪ In class: Overview, practice Excel and stats for Tuesday homework

Navigate the course in Canvas: https://canvas.colorado.edu/courses/91409

- Use modules. Within each module, you'll find everything you need for that instructional unit. This will help you anticipate what's going to happen and understand the big picture better than if you use the assignments function.
- Use calendar. Note that you can select which of your classes you want to look at.
- Scroll down on the Canvas landing page to see the course summary calendar in list format.
- Explore, so you know what's there. You can view pages, which have extra info on them to help you learn (e.g., Data types), and review Slide decks from lecture.

Get prepared and work at learning

Commit to learning statistics. Do the reading. Use reading material to take the quiz (untimed). Come to class on Friday to practice what you need to know to do the homework. Learn from the homework: make sense of the analysis you're doing. Form a study group. Come to office hours.

Grading Components, Weighting, Late Policy, Attendance

Students are expected to complete assigned homework and to read assigned readings before class. Homework is due on Tuesdays. Practice with data and statistics concepts is extremely important. Make sure you give yourself plenty of time to do the homework every week. Friday's-class practice is intended to prepare you to do the homework.

Late homework will be accepted, but 10 points will be deducted per day.

Grade Components and Their Weights

Attendance and in-class practices	10%
Quizzes	10%
Homework	40%
Exams (3)	40%
	100%

By CMCI policy, incompletes can only be assigned when a student has successfully completed a significant portion of the work in the course and when unforeseen events interrupt their ability to complete the work. An incomplete cannot be given to avoid a low grade in the course. The last day to withdraw from a class is March 13, 2023.

Attendance is Required

Attendance in this course is required. Much of what you *learn about* will occur in class and much of what you *learn how to do* will occur in class. You will practice skills in class. This practice cannot be replaced by other activities. Of course, things happen beyond our control. Two missed classes will be dropped from your total. Please plan to be in class.

Final Exam

Wednesday, May 10, 1:30–4 pm, in class. **Do not schedule travel before the exam**.

Course Schedule

Reading quizzes are always due before class on Wednesdays by 12:20 pm (except in week 1, when it's due by 11:59 pm (midnight) Wednesday). **Homework** is due by 12: 20 pm Tuesdays. This gives you plenty of opportunities to seek help on Fridays and Mondays. **Exams** require advanced preparation but are held in class.

Find links to all assignments in Canvas. May change as needed; Canvas will be up to date.

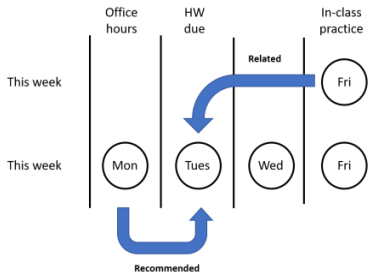
Week	Date	Prepare for class/Read	Due
Module 1: Data: Organization, Terms, Types, Quality, Sampling			
Week 1	Wednesday 18 January	Snow day!	
	Friday 20 January	Read Syllabus	
Week 2	Monday 23 January	Read Diez 9-10, 12-21, 32-34	Survey/Reading Quiz 1 (by 10:00 am)

	Tuesday 24 January		No homework
	Wednesday 25 January	Read Diez 22-31	Reading Quiz 2
	Friday 27 January	EE Basics 1-11 & Basics+ 1-5, EE Introduction (Range and Formulas & Functions)	In-class practice 1 (submit at end of class)
Module 2: Descriptive Statistics and Error			
Week 3	Monday 30 January	Transition from Module 1 to Module 2	
	Tuesday 31 January		
	Wednesday 1 February	Read Diez 40-50	Reading Quiz 3
	Friday 3 February	Read EE Functions Install Data Analysis Toolpak	In-class practice 2 (submit at end of class)
Week 4	Monday 6 February	Read Diez 61-70	
	Tuesday 7 February		HW 1
	Wednesday 8 February	Read Diez 132-141	Reading Quiz 4
	Friday 10 February	Review exercises on pp. 56- 60 and 69-70 in Diez	In-class practice 3 (submit at end of class)
Week 5	Monday 13 February	Read Reliability & Validity of Measurement	
	Tuesday 14 February		HW 2
	Wednesday 15 February	Read Making Your Data Legible pp. 1-15	Reading Quiz 5
	Friday 17 February	Review exercises pp. 142-143 in Diez	In-class practice 4 (submit at end of class)
Week 6	Monday 20 February	Catchup	
	Tuesday 21 February		HW 3
	Wednesday 22 February	Review sheet for Midterm 1	Prepare analysis for midterm
	Friday 24 February	Bring completed Midterm 1 analysis	**Midterm 1**
Module 3: Inferential Statistics			
Week 7	Monday 27 February	Read Diez 169-180	
	Tuesday 28 February		No homework
	Wednesday 1 March	Read Diez 181-189	Reading Quiz 6
	Friday 3 March	Review exercises pp. 187-188 in Diez	In-class practice 5 (submit at end of class)
Week 8	Monday 6 March	Read Diez 189-194 to section 5.3.4	
	Tuesday 7 March		HW 4
	Wednesday 8 March	Dipto was sick, no class was held	Reading Quiz 7
	Friday 10 March	Read Diez 194-201 starting w/ section 5.3.4	
Week 9	Monday 13 March	Read Diez 207-221	
	Tuesday 14 March		
	Wednesday 15 March	Read Diez 229-238	Reading Quiz 8
	Friday 17 March	Read 9 Pivot Tables pages in Excel Easy Review exercises pp. 202-203 in Diez	In-class practice 6 (submit at end of class)
Week 10	Monday 20 March	Read Diez 250-261	
	Tuesday 21 March		HW 5

	Wednesday 22 March	Read Diez 262-277	Reading Quiz 9
	Friday 24 March	Review exercises pp. 214 & 239 in Diez	In-class practice 7 (submit at end of class)
Week 11	Monday 27 March – Friday 31 March	Spring break: no classes	
Week 12	Monday 3 April	Read Diez 278-284	
	Tuesday 4 April		HW 6
	Wednesday 5 April	Read Diez 285-298	Reading Quiz 10
	Friday 7 April		In-class practice 8 (submit at end of class)
Week 13	Monday 10 April	Catchup	
	Tuesday 11 April		HW 7
	Wednesday 12 April	Review for Midterm 2	Prepare analysis for midterm
	Friday 14 April	Bring completed Midterm 2 analysis	**Midterm 2**
Module 4: Regression			
Week 14	Monday 17 April	Read Diez 304-316	
	Tuesday 18 April		No homework
	Wednesday 19 April	Read Diez 317-327	Reading Quiz 11
	Friday 21 April		In-class practice 9 (submit at end of class)
Week 15	Monday 24 April	Read Diez 327-337	
	Tuesday 25 April		HW 8
	Wednesday 26 April	Read Diez 342-353	Reading Quiz 12
	Friday 28 April		In-class practice 10 (submit at end of class)
Week 16	Monday 1 May	Begin review for final	
	Tuesday 2 May		HW 9
	Wednesday 3 May	Review for final	
	Friday 5 May	Reading day: no class	
	Wednesday 10 May		**Final exam**. 1:30-4 pm in the classroom

Recommendation

In-class practices on Friday of the week will be related to your homework that is due next week. So, it is highly recommended that you participate in-class practices. Moreover, I will have office hours on Monday and Friday. Hence, it is suggested to visit my office hours if you need help for working on your homework due on Tuesdays. See the following diagram to get an idea of how to do well in HWs due on Tuesdays.

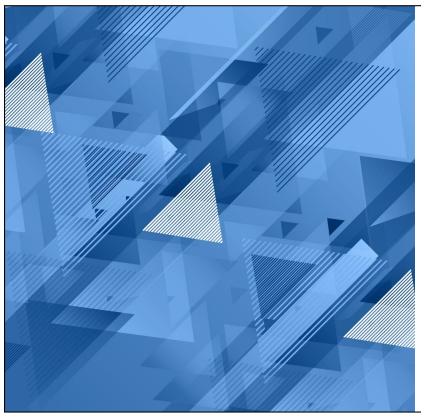


4 INSTRUCTIONAL MATERIALS, ASSIGNMENTS, AND ASSESSMENT TOOLS

This section pairs each syllabus with a representative classroom artifact: a lecture deck (design concepts → practice), a problem-solving assignment (specification, rubric, submission format), and an exam excerpt (concept → application). The latter two items include what students were expected to do, how it was assessed, and how feedback was delivered.

- Slide deck (INFO 4609): See page 19
- Assignment (INFO 2301): See page 22
- Exam Question (INFO 1301): See page 23

4.1 Sample Slide Deck from INFO 4609 (Fall 2025)



The Psychopathology of Everyday Things

DAY 2

Agenda

- Lecture on Norman's chapter 1
- In-class activity: critique everyday objects using Norman's principles

Why do we struggle with everyday objects like doors and light switches?

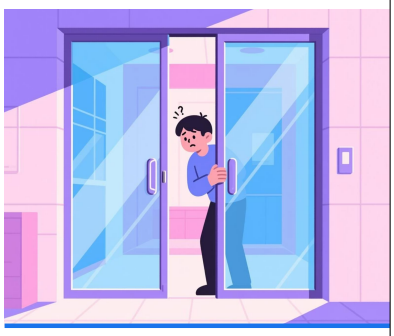
- Explores the principles of good design and how they impact our daily lives.

The Frustration of "Norman Doors"

- Have you ever pushed a door that should be pulled, or vice versa? These are "Norman doors"—designs that fail to communicate their proper use. Even simple objects can be confusing if their design doesn't clearly indicate how they work.
- https://www.youtube.com/watch?v=qtCEoGyfsxk

When Design Fails: A Post Office Predicament

- A friend was trapped in a European post office doorway. The elegant glass doors lacked visible hinges or handles, making it impossible to discern which side to push. Distracted, he pushed the hinged side, rendering the door unusable.



Discoverability and Understanding

- **Discoverability:** Can users figure out what actions are possible and how to perform them?
- **Understanding:** What does it all mean? How is the product supposed to be used? What do controls and settings signify?
- These two characteristics are fundamental to good design. When they fail, even simple devices become frustrating.

The Complexity of Modern Devices

- All artificial things are designed, from furniture to electronic devices. Design is a vast field, encompassing:
- **Industrial Design:** Optimizing product function, value, and appearance.
- **Interaction Design:** Enhancing user understanding of technology.
- **Experience Design:** Focusing on the quality and enjoyment of the total experience.

Human-Centered Design (HCD)

- The solution to frustrating designs is Human-Centered Design (HCD). This approach prioritizes human needs, capabilities, and behavior, ensuring products are understandable and usable.
- HCD is a philosophy and set of procedures that adds deep consideration of human needs to the design process.

"Good design starts with an understanding of psychology and technology. Good design requires good communication, especially from machine to person."

Why is/was the iPhone successful?

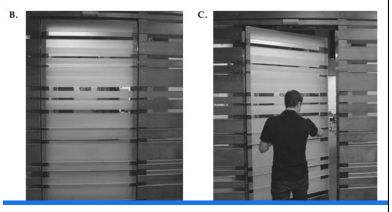
10

Fundamental Principles of Interaction: Key Psychological Psychological Concepts

- Affordances: Possible interactions between a physical object and a person.
- Signifiers: Communicating where an action should take place.
- Mapping: Relationship between controls and their efforts.
- Feedback: Communicating the results of an action.
- Conceptual Models: Simplified explanations of how something works.

Affordances and Signifiers

- Affordances: The inherent properties of an object that suggest how it can be used (e.g., a chair affords sitting). Some are perceivable, others are not.
- Signifiers: Any perceivable indicator that communicates appropriate behavior (e.g., a "push" sign on a door). Signifiers are crucial for good design.



Affordances = Usability clues

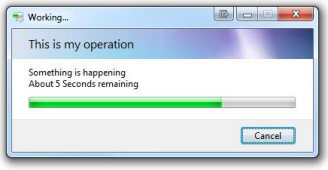
Mapping and Feedback Feedback

- Mapping: The relationship between controls and their effects. Natural mappings, like a car seat adjustment control shaped like a seat, lead to immediate understanding.
- Feedback: Communicating the results of an action. Immediate and informative feedback is crucial. Poor or excessive feedback can be more annoying than useful.

Stove

•Which controls which? How would you design this better?

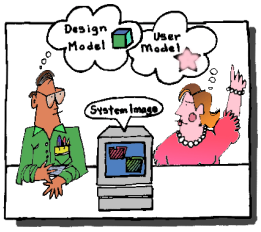
18



16

Conceptual Model

- User perspective: This is how I think "it" should work
- Users "build" their own systems of how things work
- Designers can help users foster an appropriate conceptual model
- Appearance, instructions, behavior, …



An ill-conceived conceptual model

18

Can you figure out how to use these?

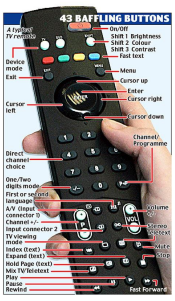
Constraints

- User perspective: Why can't I do that?
- Restrictions on possible actions that can be performed
- Helps prevent users from selecting incorrect options
- Physical objects can be designed to constrain interaction
- Can you think of examples?

The Paradox of Technology

- Technology simplifies life with more functions but complicates it by making devices harder to learn and use. This is the core challenge for designers.
- Great design requires collaboration across disciplines to create products that are usable, attractive, affordable, reliable, and ultimately, loved by customers.

Ummm…. yeah



22

Group Activity

- Think of a poorly designed artifact and critique why it is "bad"
- You can use this link for inspiration/examples: http://www.baddesigns.com/examples.html

Next Class

- Reading: Norman Ch.2
- Reading quiz 2: Aug 31
- Reading reflection: Sep 9

4.2 Example Assignment from INFO 2301 (Spring 2025)

HW 2: Module 2

Published | Assign To | Edit

This homework has three problems. You must solve them and write the solutions in LaTeX. The submittable is a zip file with the **.tex** and **.pdf** files generated from Overleaf.

Problem 1 (10 pts):

In a deck of 52 playing cards, you draw one card at random. What is the probability of drawing a Queen, given that the card drawn is a face card (Jack, Queen, or King)?

Problem 2 (20 points):

Let's assume three closed doors: door 1, door 2, and door 3. Behind one of those doors is a million dollars. Behind each of the other two doors is a goat. The game show host, Monty Hall, asks the contestants to pick a door. After they pick the door, but before he opens the door they picked, he opens one of the other doors to reveal a goat. He then asks the contestant, "Would you like to switch doors?" Help the contestant to make a probabilistically more sensible choice.

Problem 3 (20 points):

A particular disease affects 1% of the population. A diagnostic test for this disease has the following characteristics:

- 95% sensitivity (the test correctly identifies 95% of the people who have the disease).
- 90% specificity (the test correctly identifies 90% of the people who do not have the disease).

If a person tests positive, what is the probability that they actually have the disease?

Points	50
Submitting	a file upload

Due	For	Available from	Until
Apr 3	Everyone	Mar 6 at 12am	May 1 at 11:59pm

+ Rubric

4.3 Final Exam Question for INFO 1301 (Spring 2023)

READ THIS FIRST. You should have nothing on your desk but this test and pen/pencil/eraser. **NO PHONES**[1]. The entire exam is **multiple choice or select all that apply.** Make sure you read all instructions, such as whether you should choose only one answer or should select all that apply. Feel free to explain your answers in the margins, between the lines, at the bottom of the page, or on the last page, but please write neatly. The exam totals 168 points.

Outline of the exam

Part 1: Demonstrate your knowledge of specific concepts outside of any analysis context (15 questions/60 points)
Part 2: Apply concepts within four short analysis contexts based on understanding the data (16 questions/48 points)
Part 3: Apply concepts to two real-life scenarios (Kiva.org donations; Ukraine-Russia poll) (10 questions/40 points)
Part 4: Interpret multiple regression output predicting exam scores (5 questions/20 points)

Part 1: Define or describe concepts outside of any context (4 points each, Total: 60 points)

1. Why is probability sampling preferred over non-probability sampling? Circle the single best answer.
a) Probability sampling is not random, which reduces noise
b) In non-probability sampling, every unit in a population has an equal chance of being selected
c) Probability sampling is less expensive
d) Probability sampling is random, which theoretically reduces bias
e) None of the above

2. To warrant belief in a generalization, which of the following should be true of a sample on which the generalization is based? Circle all that apply.
a) The sample is representative of the population about which claims are being made
b) The sample is large enough
c) The sample is as small as possible
d) The sample was selected by a scientist
e) None of the above

3. Which of the following allows us to evaluate dispersion? Circle all that apply.
a) Range
b) Interquartile range
c) Standard deviation
d) Mode
e) None of the above

4. Which of the following are measures of variability from the mean? Circle all that apply.
a) Standard error
b) Variance
c) Standard deviation
d) σ
e) $\bar{x}$

5. Which of the following statements describes a confidence interval? Circle the single best answer.
a) A plausible estimate of a range of values within which a population parameter falls, based on a sample statistic
b) An evaluation of which of two mutually exclusive statements provides the most convincing evidence about a population parameter, based on a sample statistic
c) An evaluation of whether the distribution of observations in a sample is unusually different from what might be expected

[1] Anyone looking at their phone for any reason will be asked to leave the room. It will not be possible to complete the exam.

d) A measure of distance from the mean in the units of standard deviation
e) The degree to which data truly measures what it is intended to measure

6. Which of the following statements describes construct validity? Circle the single best answer.
a) A plausible estimate of a range of values within which a population parameter falls, based on a sample statistic
b) An evaluation of which of two mutually exclusive statements provides the most convincing evidence about a population parameter, based on a sample statistic
c) An evaluation of whether the distribution of observations in a sample is unusually different from what might be expected
d) A measure of distance from the mean in the units of standard deviation
e) The degree to which data truly measures what it is intended to measure

7. Which of the following statements describes a chi-squared analysis? Circle the single best answer.
a) A plausible estimate of a range of values within which a population parameter falls, based on a sample statistic
b) An evaluation of which of two mutually exclusive statements provides the most convincing evidence about a population parameter, based on a sample statistic
c) An evaluation of whether the distribution of observations in a sample is unusually different from what might be expected
d) A measure of distance from the mean in the units of standard deviation
e) The degree to which data truly measures what it is intended to measure

8. Which of the following statements describes a z-score? Circle the single best answer.
a) A plausible estimate of a range of values within which a population parameter falls, based on a sample statistic
b) An evaluation of which of two mutually exclusive statements provides the most convincing evidence about a population parameter, based on a sample statistic
c) An evaluation of whether the distribution of observations in a sample is unusually different from what might be expected
d) A measure of distance from the mean in the units of standard deviation
e) The degree to which data truly measures what it is intended to measure

9. Which of the following visualizations is most useful for evaluating the relationship between two variables? Circle the single best answer.
a) Histogram
b) Box and whisker plot
c) Scatterplot
d) Line chart
e) Frequency distribution

10. Which of the following visualizations is most useful for determining the shape of a distribution for numerical data? Circle the single best answer.
a) Histogram
b) Box and whisker plot
c) Scatterplot
d) Line chart
e) Frequency distribution

11. Which of the following visualizations helps us to understand whether a variable changes over time? Circle the single best answer.
a) Histogram
b) Box and whisker plot
c) Scatterplot
d) Line chart
e) Frequency distribution

12. Which of the following visualizations helps us to understand the occurrence of different values of a categorical variable? Circle the single best answer.
a) Histogram
b) Box and whisker plot
c) Scatterplot
d) Line chart
e) Frequency distribution

13. Which of the following are required steps in conducting tests of inference? Circle all that apply.
a) Identify alpha
b) Test for normality of distribution
c) Test for independence of variables
d) Test for equality of variance between variables
e) Choose the right kind of test

14. Why should an analyst calculate and report effect size? Circle all that apply.
a) Because a statistically significant difference shows that the difference is large
b) To determine whether a statistically significant difference is practically meaningful
c) Because the p-value shows how unlikely a difference or relationship is
d) To be able to communicate the strength of a difference found in "real life"
e) To describe how the test affected human subjects

15. Why should an analyst be concerned with statistical power? Circle all that apply.
a) To ensure they collect enough data that they can detect any practical effects
b) To minimize the cost of collecting data
c) To understand the true magnitude of any differences found
d) To ensure they can reject false positives
e) To minimize risk to human subjects

Part 2: Application of concepts in various datasets (3 points each, Total: 48 points)

You've been asked to make good statistical judgments about four tiny data sets. For each analysis, look over the data, then answer the **4 questions (a-d)** to the right of **each data set**. Select only one response ✓ per question. If you think there can be multiple correct answers, select the best one and briefly write your rationale. 3 points each.

16. Time for a meal! Below are data for two variables, "Meal Time" and "Cost ($)." 12 points.

Meal Time	Cost ($)
1 Breakfast	24.07
1 Breakfast	23.86
1 Breakfast	30.28
1 Breakfast	21.73
1 Breakfast	17.07
1 Breakfast	29.75
2 Lunch	22.77
2 Lunch	26.65
2 Lunch	22.06
2 Lunch	27.69
2 Lunch	21.31
3 Dinner	42.26
3 Dinner	21.83
3 Dinner	17.33
3 Dinner	83.97
3 Dinner	31.83

a. Which type of variable is "Meal Time"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

b. Which type of variable is "Cost ($)"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

c. Which measure of central tendency makes the most sense for "Cost ($)"?

- ○ Mode
- ○ Mean
- ○ Median
- ○ Any of the above

d. Which statistical test should you use to compare cost by meal time?

- ○ Correlation
- ○ Paired T-test
- ○ Independent T-test
- ○ ANOVA
- ○ Chi-Squared

17. Who's eating what? Below are data for two variables, "Attendee" and "Diet." 12 points.

Attendee	Diet
0 Youth	2 Vegan
0 Youth	1 Traditional
0 Youth	1 Traditional
0 Youth	4 Paleo
0 Youth	3 Vegetarian
0 Youth	1 Traditional
0 Youth	1 Traditional
1 Adult	1 Traditional
1 Adult	2 Vegan
1 Adult	3 Vegetarian
1 Adult	1 Traditional
1 Adult	4 Paleo
1 Adult	2 Vegan
1 Adult	3 Vegetarian
1 Adult	1 Traditional
1 Adult	1 Traditional

a. Which type of variable is "Attendee"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

b. Which type of variable is "Diet"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

c. Which measure of central tendency makes the most sense for "Attendee"?

- ○ Mode
- ○ Mean
- ○ Median
- ○ Any of the above

d. Which statistical test should you use to compare choice of diet?

- ○ Correlation
- ○ Paired T-test
- ○ Independent T-test
- ○ ANOVA
- ○ Chi-Squared

18. Headed to campus. Below are data for two variables, "Car Owner", "Commute Time (minutes)." 12 points.

Car Owner	Commute Time (minutes)
0 No	37
0 No	42
0 No	12
0 No	17
0 No	32
0 No	20
0 No	11
1 Yes	41
1 Yes	37
1 Yes	10
1 Yes	34
1 Yes	29
1 Yes	28
1 Yes	64
1 Yes	24
1 Yes	21

a. Which type of variable is "Car Owner"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

b. Which type of variable is "Commute Time"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

c. Which measure of dispersion makes the most sense for "Commute Time"?

- ○ Interquartile range
- ○ Inter-coder reliability
- ○ Standard deviation
- ○ Any of the above

d. Which statistical test should you use to compare commute time by car ownership?

- ○ Correlation
- ○ Paired T-test
- ○ Independent T-test
- ○ ANOVA
- ○ Chi-Squared

19. Inflation. Below are data for three variables, "Item," "Price ($) in 2020," and "Price ($) in 2022." 12 points.

Item #	Price ($) in 2020	Price ($) in 2022
1	42.26	53.04
2	41.83	52.38
3	33.86	51.11
4	32.28	48.91
5	29.75	42.31
6	27.69	40.94
7	26.65	24.83
8	24.07	35.30
9	23.97	35.47
10	22.77	36.36
11	22.06	36.96
12	21.83	39.54
13	21.73	39.75
14	21.31	34.41
15	17.33	26.65
16	17.07	25.22

a. Which type of variable is "Item"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

b. Which type of variable is "Price ($) in 2020"?

- ○ Nominal
- ○ Ordinal
- ○ Interval
- ○ Continuous

c. Which measure of dispersion makes the most sense for "Price ($) in 2022"?

- ○ Interquartile range
- ○ Inter-coder reliability
- ○ Standard deviation
- ○ Any of the above

d. Which statistical test should you use to compare 2020 and 2022 prices?

- ○ Correlation
- ○ Paired T-test
- ○ Independent T-test
- ○ ANOVA
- ○ Chi-Squared

Part 3: Analyze two problem contexts (4 points each, Total: 40 points)

Read Scenarios A (Kiva.org) and B (Ukraine-Russia conflict) and answer the **5 questions** below each scenario. Questions are worth 4 points each, 40 points total. Circle only one answer per question in both Part 3 scenarios.

A. Does evidence of social good increase donations?

Kiva.org, a non-profit organization, allows people to lend money to low-income entrepreneurs and students in many countries. The Kiva advertising team wondered whether providing more evidence of the social benefits of donating might make visitors more likely to donate money. To find out, Kiva conducted an A/B test. They created two versions of a website landing page. Both versions included the original Kiva.org language (Version A), but Version B added an information box about how loans had improved recipients' lives. Users saw either Version A or Version B when they entered the site. The team used log data to determine whether the users clicked the "donate now" button or not. They compared the data to see whether Version A or Version B resulted in more clicks to "donate now." Assume p_i stands for proportion for the i-th sample.

20. What kind of study is this?

a. Observational
b. Attributional
c. Experimental
d. Distributional
e. All of the above

21. Which of the following is the best statement of a null hypothesis for this study?

a. There is no difference between users who donate and users who do not donate to Kiva.
b. Kiva users who are provided more information donate more than Kiva users who are not provided more information.
c. The same proportion of users who are provided more information click on the "donate now" button as users who are not provided more information.
d. H_0: $p_1 = p_2$
e. H_A: $p_1 < p_2$

22. What kind of test should the advertising team use to determine whether there is a difference in average "donate now" clicks between users provided with Version A and Version B?

a. T-test for two independent groups
b. Hypothesis test for two proportions
c. Confidence interval for a mean
d. ANOVA
e. None of the above

23. The advertising team found that those who were provided more evidence of the value of donating clicked on the "donate now" button more often than those who were not provided more evidence. What information do you need in order to believe whether more information led to more donation?

a. The difference between the likelihood of clicking and not clicking for Version A and Version B is extremely unlikely if the extra information made no difference.
b. The sample was randomly assigned Version A or Version B.
c. The only difference between Version A and Version B is the additional information.
d. Users must be served Version A or Version B prior to seeing the "donate now" button.
e. All of the above

24. Just to be sure, the advertising team ran the study again. They wanted to know if they would get the same results. What kind of reliability is this? Circle one answer.

a. Test/retest reliability
b. Inter-rater reliability
c. Parallel forms reliability
d. Internal consistency
e. None of the above

B. What are Americans' views of the Ukraine-Russian conflict? Poll published May 2, 2022

An ABC News/Washington Post poll was conducted by telephone April 24-28, 2022, in English and Spanish. The random national sample included 1,004 adults. The results have a margin of error of 3.5 percentage points. In addition to asking opinions, the poll collected data on gender, political party, education level, and household income of each respondent.

25. According to the news article, 55% of the sample favored increased military support for Ukraine. What percent of all Americans favor increased military support for Ukraine?

a. 55%
b. Between 51.5% and 58.5%
c. Between 55% and 65%
d. 95%
e. None of the above

26. The poll asked how concerned the respondents were about U.S. forces getting involved in the war. On a rating scale from 1-4, with 1 being "not at all concerned" and 4 being "very concerned," the average rating was 3.1. The article reported that women are more concerned than men about U.S. forces getting involved. What kind of hypothesis test do you recommend that the pollster use to find out whether the difference between men and women is statistically significant?

a. ANOVA
b. Linear regression analysis
c. Confidence interval for a single proportion
d. t-test
e. None of the above

27. The poll also asked how concerned respondents were about the war leading to higher consumer prices. On a rating scale from 1-4, with 1 being "not at all concerned" and 4 being "very concerned," the average rating was 2.73. What kind of hypothesis test do you recommend that the pollster use to find out whether the difference between democrat, republican, and independent voters is statistically significant?

a. ANOVA
b. Linear regression analysis
c. Confidence interval for a single proportion
d. t-test
e. None of the above

28. The pollsters asked four questions to gauge respondents' concerns about the war. These included higher prices of consumer products, U.S. forces getting involved, the war expanding to more countries, and Russia using nuclear weapons. These four questions were combined into one new composite variable called "War Concern." To make sure that it makes sense to combine the four concern variables into "War Concern," what kind of reliability test do you recommend that the pollster perform?

a. Test/retest reliability
b. Inter-rater reliability

c. Parallel forms reliability
d. Internal consistency
e. None of the above

29. In the methodology section of the survey, the pollster writes that the poll required a probability-based sample that contacted both landline (25%) and cell (75%) telephones. The pollster reports that they have increased the percent of cell phone interviews over time because they were not reaching enough young adults. What concern are the pollsters addressing by shifting to a higher percentage of cell phones?

a. Construct validity
b. Systematic distortion
c. Parallel forms reliability
d. Noise
e. None of the above

Part 4: Interpret multiple regression output (4 points each, Total: 20 points)

30. Below is the regression equation of a model. Which variable is the dependent variable in the model? Select all that apply.
Predicted Sales = 52.34 + 1.12 * Marketing_Budget + 0.85 * Social_Media_Spend - 0.43 *Discount_Offered
a) Sales
b) Marketing_Budget
c) Social_Media_Spend
d) Discount_Offered
e) None of the above

31. Which independent variable has the greatest predictive power in the regression model?
a) Marketing_Budget
b) Social_Media_Spend
c) Discount_Offered
d) All variables have equal predictive power
e) None of the variables predict the outcome

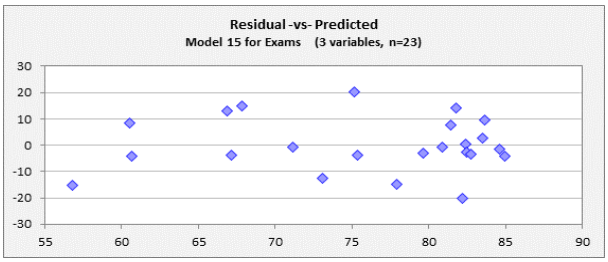
32. Which output statistic(s) would you use to assess collinearity among independent variables? Select all that apply.
a) Coefficient
b) R-squared
c) P-value
d) Variance Inflation Factor (VIF)
e) Standard Error

33. Based on the regression output below, which independent variable(s) should you remove due to lack of statistical significance? Select all that apply.

Variable	Coefficient	Std. Error	t-Statistic	P-value	Lower95%	Upper95%
Constant	30.45	12.34	2.47	0.018	5.12	55.78
Ad_Spend	0.75	0.62	1.21	0.235	-0.50	2.00
Product_Rating	1.22	0.45	2.71	0.012	0.29	2.15
Competitor_Discount	-0.48	0.50	-0.96	0.345	-1.52	0.56

a) Ad_Spend
b) Product_Rating
c) Competitor_Discount
d) None of the above

34. The residual-vs-predicted plot below is used to determine whether the data meet the conditions of linearity and constant variation. Why should an analyst make sure the data meet these conditions in linear regression? Circle all that apply.



a) To feel confident about the results of inferential tests, an analyst needs to be sure the data meets assumptions and conditions.
b) If a line isn't straight, any estimation of y based on a known x is unreliable.
c) If the data fan out, the model will have more error with respect to predicted values.
d) If the data fan out, the data are not independent.
e) If a line isn't straight, the data are not normally distributed.

5 TEACHING EVALUATIONS

5.1 Teaching Award and Pedagogical Assessment

- **Teaching Excellence Award (TEA):** In Spring 2024, the Graduate and Professional Student Government (GPSG) at the University of Colorado Boulder formally recognized my outstanding contributions to teaching. The recognition was based on a comprehensive evaluation rubric that assessed student engagement, commitment to professional growth, and the overall significance of my teaching. The evaluation particularly highlighted my emphasis on inclusive classroom practices, responsiveness to student feedback, and the clear articulation of a reflective and evolving teaching philosophy. Official notification of this recognition was conveyed via email.
- **Quality Assurance of Teaching and Learning Methods and Curriculum:** In 2017, the Institutional Quality Assurance Cell (IQAC) at Dhaka International University evaluated my teaching competencies. The assessment highlighted my proficiency in effective course design, the application of active learning strategies, the implementation of formative and summative assessment methods, and my commitment to improvement in teaching practices.

5.2 Students' Feedback

5.2.1 Qualitative Evaluation

The following selected comments from students in the formal evaluation at the University of Colorado Boulder through the Faculty Course Questionnaire (FCQ), between Fall 2021 and Spring 2025, highlight my teaching strengths in clarity, engagement, and support for student learning.

> "Dipto is the best teacher I've ever had in my past 3 years here at CU Boulder. He is very aware in general. He can tell when the class doesn't understand and always is sure to provide plenty of practice examples. He makes himself very available to help his students throughout each week, and does a fantastic job of clarifying mistakes in a way that teaches the student how to critically think, not just giving the student the answer (give a man a fish vs teach a man a fish). ... I cannot express how helpful Dipto has been to my growth as a learner. If I could nominate him for a teaching award, I would do it 100%!" (Fall 2024)

> "Dipto was my favorite professor this semester. He always comes to class with a smile on his face and has a really infectious, positive energy. His Canvas setup is great, and it is really easy to review notes and complete assignments. ... I like how we have a very structured weekly plan, and the in-class practices on Fridays were great and super helpful!" (Spring 2023)

> "Dipto Das is very excited about the topic, and I know that when he teaches the course on his own, he will do a fantastic job. He is always willing to work with the students to help them understand a topic further; often, he has his own experience or story to give a good example. Sometimes it is difficult to understand his accent, but he is always willing to repeat himself, and over time, I certainly got used to it. The course is challenging and prepares students well for more advanced statistics and data science courses. There is a lot of material to cover. I feel that I have learned so much about this course and that it has taught me many valuable skills." (Fall 2022)

> "Dipto was incredibly kind, and it is obvious that he cares a lot about his recitation. I honestly think I learned more practical skills from the recitation than the lecture portion of this class [taught by a different professor]. Dipto taught me new approaches to the types of problems posed in lecture, and is probably the best programmer I've seen so far. If he teaches [INFO] 2201, I will make every effort to be in his recitation section. Amazing TA!" (Spring 2022)

5.2.2 *Quantitative Evaluation (Fall 2024)*

A = INFO 1301 B = INFO 2301		1- Hardly Ever	2- Occasionally	3- Sometimes	4- Frequently	5- Almost Always	Not Applicable	Mean	Standard Deviation	Did Not Answer	Total Responses
Q9. Demonstrated respect for diverse students and diverse points of view.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	14.29% (1)	14.29% (1)	71.43% (5)	0% (0)	4.57	0.73	0	7
Q10. Challenged me to develop my own knowledge, comprehension, and conceptual understanding.	A	0% (0)	0% (0)	0% (0)	16.67% (1)	83.33% (5)	0% (0)	4.83	0.37	0	6
	B	0% (0)	0% (0)	14.29% (1)	14.29% (1)	71.43% (5)	0% (0)	4.57	0.73	0	7
Q11. Gave projects, tests, or assignments that required original or creative thinking.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	0% (0)	57.14% (4)	42.86% (3)	0% (0)	4.43	0.49	0	7
Q12. Provided opportunities for students to ask questions and initiate discussion.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	0% (0)	42.86% (3)	57.14% (4)	0% (0)	4.57	0.49	0	7
Q13. Provided feedback on my work that helped me improve my performance.	A	0% (0)	0% (0)	16.67% (1)	0% (0)	83.33% (5)	0% (0)	4.67	0.75	0	6
	B	0% (0)	0% (0)	28.57% (2)	42.86% (3)	28.57% (2)	0% (0)	4	0.76	0	7
Q14. Explained the grading criteria for assignments.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	14.29% (1)	42.86% (3)	42.86% (3)	0% (0)	4.29	0.7	0	7
Q15. Was available to answer questions or provide assistance when needed.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	14.29% (1)	42.86% (3)	42.86% (3)	0% (0)	4.29	0.7	0	7
Q16. Effectively used available technology to enhance learning.	A	0% (0)	0% (0)	0% (0)	0% (0)	100% (6)	0% (0)	5	0	0	6
	B	0% (0)	0% (0)	0% (0)	42.86% (3)	42.86% (3)	14.29% (1)	4.5	0.5	0	7

5.3 Peer Evaluation by the Department Chair

February 17, 2023

Subject: Peer Review of Teaching for Dipto Das by Robin Burke

INFO 1301: Statistics for Information Science
Spring 2023
Date of class observation: February 13, 2022 (Monday of Week 5)
Number of students in class on day: 39
Total number of students in course: 45

Overview of Observation Method. I met with Mr. Das in advance of his class on the day of observation so I could have an overview of the course and be pointed to areas where he wanted feedback. I then observed a full class meeting (approximately 40 minutes) before meeting alone with the students for 10 minutes. Prior to this time, I obtained access to the associated Canvas site for the course and was able to examine the materials including the syllabus. We met later that day to my findings and I shared this report with him before finalizing it.

Notes from Initial Meeting Between Burke and Das. INFO 1301 is an introductory course to statistics taken by a range of majors (not just INFO) and by students at a range of different levels from lower division to senior. A small number of students have some statistics background already. Mr. Das is following closely the course design used by Prof. Barker who taught the class in several prior semesters and for whom he served as a TA. However, he did indicate that he had changed several of her practices based feedback from prior groups of students. In particular, instead of having students change seats every class for their in-class practice sessions, he allows students to sit as desired. The prior practice had the side-effect of reducing the amount of time on task that was possible in these sessions, which the students already considered too short.

Mr. Das's main concern about the class was the wide range of statistics knowledge present and the challenge of teaching to a class with this diversity of pre-existing knowledge. According to his pre-class survey, 15 students (1/3 of the class) indicated that they had no prior experience with statistical concepts.

Overall organization of course. The course is taught three times each week over the 15 instructional weeks of the semester. There are more or less weekly homework assignments and weekly quizzes tied to the reading material. There are three exams: two midterms and a final. The homework assignments are structured as Canvas quizzes. Fridays are devoted to in-class exercises that are intended to provide practice for the techniques needed for the next week's homework. Mr. Das emphasizes participation and makes attendance a requirement.

Observation of Classroom Instruction. The class is taught in CASE W262, which has groups of small tables and is conducive to group work. Mr. Das began the class with some sign-posting, indicating where in the semester the class was and what the important milestones were including the midterm, scheduled for the following week. He indicated that he would be launching a survey to the students asking what they would like an upcoming midterm review session to include.

Mr. Das then moved on to a review of the previous week's discussion of visualization then moved to extend that topic with additional types of visualizations. PowerPoint slides were combined with interactive use of the whiteboard. Mr. Das solicited answers from the class and generally got good participation. At one point, he had the groups discuss a question amongst themselves and report to the class.

The class focused on four of the most common types of visualization used in the class: bar plots, histograms, scatter plots, and line plots. A key goal of the lesson was to get students to understand what types of visualizations would be appropriate for what kinds of data. He also included some examples of deceptive visualizations.

There were three aspects of the class that I thought could be improved. One was that the visualizations displayed on the slides were created using a variety of tools. I think it would have been better to stick just with Excel since that is the tool that students are learning in this class. This way they would be better able to map from the lecture content to what they are asked to do in their assignments. I also thought that the hand-drawn visualizations on the whiteboard were not as effective as the ones rendered on the slide. They were necessarily smaller and harder to see, and it is harder to make the distinctions between different rendering choices clear when drawing. Creating these drawings also takes time. A third minor point is that temperature vs time of day is probably a better example for a line plot or even a bar plot if the readings are always taken at the same times.

Overall, the lecture seemed to work very well. Students were mostly attentive and following along (although I did notice some using their devices for non-class purposes.)

Feedback from Students. The students clearly appreciate Mr. Das as an instructor. When I asked what about the course is working, they had a lot to say. They thought the class was well organized and appreciated the scaffolding built into the course design. They also said that Mr. Das explained things well and the instructions for assignments were very clear, so they always knew what was expected. They also appreciated his quick response to student emails: the word “lightning” was used.

Overall, students liked the Canvas site and its organization but there were fairly widespread complaints about the grading scheme for the Canvas quizzes. Apparently students do not have the opportunity to find out what answers are incorrect and this makes the option to submit multiple times not very useful. Once I pointed this out to him, Mr. Das was able to make a slight adjustment to Canvas settings and correct the problem.

High-Level Review of Syllabus and Canvas. All required syllabus statements are included. The syllabus is very thorough and provides clear statements of expectations and course organization. The Canvas site mirrors the syllabus and is well organized. The slides and other materials are posted after class.

Closing Comments. I appreciated this opportunity to observe Mr. Das’s class. It is his first opportunity to teach as the instructor of record and I commend him for his success with this class.

Respectfully submitted by Robin Burke