



## Math 1070 Section 003

### Introduction to Statistical Inference

**Class Hours: MWF—2:00pm-2:50pm, JWB 335**



**Instructor:** Max Black (see photo, and no, Kalby (the dog) cannot come to class).

**Email:** black@math.utah.edu

**Office:** JWB 121

**Office Hours:** T/TH at 11:00am-12:00pm and by appointment

Please note this syllabus is subject to change throughout the semester as I see fit, **with or without notice** (though I will try notifying everyone). By not withdrawing/transferring from this class, you hereby agree to the following class policies and procedures outlined below.

**Course Description:** This course is a survey of the important topics used in making inferences from data. The course emphasizes material on descriptive statistics, estimation of the mean, or of the proportion, in one or two populations, simple linear regression, and one-way analysis of variance.

**Prerequisite(s):** Completion, with a grade of C or better, of Math 1010 or Accuplacer CLM score of 50 or better.

*Important Note:* The mathematics department DOES enforce prerequisites for all our undergraduate courses. If you were able to register for this class based on your enrollment in the prerequisite course last semester, and you did not receive the minimum grade in that course to continue on with your math classes, then you will be dropped from this class on Friday of the first week of classes. If that is the case for you, then it is in your best interest to drop yourself from this class before you are forcibly dropped and get into a class for which you have the prerequisites.

**Note(s):** A minimum grade of C is required to progress to further courses.

**Credit Hours:** 3

**Text(s):** *The Basic Practice of Statistics*, 6<sup>th</sup> or 7<sup>th</sup> Edition (we'll talk about this)

**Author(s):** David S. Moore et al. **ISBN-13:** 978-1464142536

#### Course Objectives:

After successful completion of this course, students will be able to:

- summarize data using charts, graphs, histograms, and calculate basic descriptive statistics like the mean, standard deviation, median, and quartiles.
- work with the normal distribution and use z-score tables to find probabilities.

- understand the difference between correlation and causation (they're similar but very different).
- perform regression analysis and compute correlation.
- understand the Central Limit Theorem (it's kinda freaking awesome) and the normality assumption.
- understand the basics of tests of significance and confidence intervals including z-tests, t-tests, proportion tests, Chi-square tests, ANOVA, and non-parametric tests.
- perform simple statistical analysis of large data sets using spreadsheets (throughout the whole course).

### Grade Distribution:

Homework	20%
Quizzes	15%
Exam 1	15%
Exam 2	15%
Project	5%
Final Exam	30%

### Letter Grade Distribution:

$\geq 93.00$	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	$\leq 59.99$	E (this is an F)

### Course Policies:

- **Attendance**

- I do not require you to attend class. However, it is **highly** recommended you do, as that is when/where I'll be answering questions and discussing concepts covered in the readings and assessed on quizzes/exams. Furthermore, I may make changes to assignments, the class structure, grades, etc., and those announcements will be made in class. I will post these announcements in Canvas, but you may not know to check for them.

- **Homework**

- Homework is a completion grade. However, you must make a concerted effort on every assigned problem; your work will be evidence of this effort. If, for some reason, a problem requires little work, please write 3-5 sentences explaining the concepts underlying the problem. This way, you can avoid losing points. If a problem is missing or has perceptible no effort, then you will receive a 0 on the assignment.
- Homework will be collected at the end of class during the last session of each week.
- I will post solutions the day after I collect the homework (or the day of, if possible). And consequently, I will not accept late homework. In regards to other assignments being turned in, I will not accept them late. Late work in any case is only accepted if prior arrangements have been made between you and I. If extenuating circumstances arise, **please** contact me; however, to maintain fairness in the classroom, I will require official

evidence: a letter from the dean of students, a doctor's note, official letters from the relevant academic administrators, or, perhaps, a police report. Please keep in mind the preceding list is non-enumerative.

- I am requiring you to read the textbook. I will expect you to have read the chapter for the upcoming week before each Monday. That way you can come prepared with questions and can work on the in-class problems.
- We will be using the problem set found in the 6<sup>th</sup> edition, you may, however, read from either edition. If you do NOT have the 6<sup>th</sup> edition, please see Canvas, under “files”, for the problem sets.
- All homework is to be handwritten. I will only make exceptions in rare circumstances. On that note, please keep in mind the course grader is not required to award points to homework that is illegible due to poor formatting, poor handwriting, ruined paper, etc. You will find an example of acceptable homework posted in Canvas under “files”. Again, please note this is a non-enumerative list.
- If you would like to contest a grade on a homework assignment, you may do so up to a week after it has been handed back. To do this, simply speak to me after or before class and turn in the homework whose grade you are contesting with the next batch. I will personally review it and get back to you within a week. Again, exceptions will be made in extreme circumstances only.
- Students are encouraged to work together in groups (mathematics is a social science, after all ☺). However, your solutions are expected to be your own. That is, despite a group deriving a solution, your work and/or explanations are expected to be unique. Again, you are expected to establish authorship of a work. Any referenced work must be clearly documented, cited, and attributed, regardless of media or distribution. Even in the case of work licensed as public domain or Copyleft, (See: <http://creativecommons.org/>) you must provide attribution of that work in order to uphold the standards of intent and authorship. Please note that plagiarism will not be tolerated and will be dealt with in accordance to university policy.

#### • Grades

- Grades in the **C** range represent performance that **meets expectations**; Grades in the **B** range represent performance that is **substantially better** than the expectations; Grades in the **A** range represent work that is **excellent**.
- I do not round grades. No exceptions.
- You may find your grades under the Canvas section for this course entitled “grades”. Students are required to track their progress throughout the semester and voice any concerns or questions with me through the appropriate channels of communication.

#### • Quizzes and Exams

- Quiz and Exam dates! They're not moving. They will take place according the schedule found at the end of the syllabus.
- Quizzes and Exams are closed-note, closed-book, and closed-neighbor unless otherwise stated.
- During exams, you will have the first 10 minutes to look over the problems and note any questions you may have. At the ten minute mark, I will address and answer any

clarifying questions the class may have. After the question period is over, you may not ask me any other questions or leave your seat. If you need to leave your seat for any reason (unless extenuating circumstances are previously stated and an agreement between you and I is made), I will not allow it. I will not interrupt other people's exam time after the question period.

– **No makeup quizzes or exams will be given.**

- **Technology**

- I am quite the luddite. And supporting my personal preference, there is an overwhelming amount of educational research showing a strongly positive correlation between memory retention rates and writing notes by hand. Consequently, I will not allow computers in the classroom; nor am I allowing cell phones—no, not even as a calculator.
- If technology is allowed during a class, I will notify you during the previous session; that way, you may plan accordingly.

- **Contacting Me Outside of Class**

- Email is the best way to reach me (see above). Please note, I answer my email once per day during the week. I rarely make exceptions. Hence, please send your emails with this in mind. Though annoying, this does make my turn-around rate roughly 24 hours, during the week. Weekends are treated differently; I reserve them for my personal life (I know, hard to believe I have one). I will do my best to respond in a timely manner, but expect a response by Monday during my usual email time, if emailing over the weekend.

- **Student Resources**

- Some of the ideas in this class are fairly large and can be unwieldy. So, if you have questions there are a couple of places you can have them answered!
  - \* My office hours: I will be in my office, (JWB 121, located in the basement) on Tuesdays and Thursdays from 11:00am-12:00pm. Please feel free to drop by with any questions, comments, and/or concerns you may have. If you are unable to make it to either of these times, please email me and I'm sure we can figure something out. The doors to my office are locked (as it is in a larger room) so I will actually be holding my office hours just outside of them in front of the room sign for JWB 121.
  - \* The tutoring center: There is a FREE tutoring center located in the west end of the LCB basement (LCB 115). It is open Mondays-Thursdays, 8:00am-8:00pm and Fridays, 8:00am-6:00pm. The center has tutors, a microwave, fridge, computers (where you can print for free), and lots of space to work. I've been told you can feel free to stay there all day!
  - \* Private tutoring: University Tutoring Services, 330 SSB (they offer relatively inexpensive tutoring (\$7 per hour)). There is also a list of tutors at the Math Department office in JWB 233.

- **ADA Statement**

- The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class,

reasonable prior notice needs to be given to the Center for Disability & Access (CDA), 162 Olpin Union Building, 581-5020 (V/TDD). The CDA will work with you and I to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to CDA.

- **Addressing Sexual Misconduct**

- Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veterans status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).
- **PRIVACY DISCLAIMER:** please feel free to talk to me about any misconduct you have heard/seen/experienced. However, if you disclose to me any form of sexual, gender-based harassment, intimate partner violence, sexual exploitations, stalking, nonconsensual sexual contact, nonconsensual sexual penetration, sexual domestic violence, sexual assault, or stalking I am, as an employee of the University of Utah, a mandatory reporter. I am not confidential. If I observe through sight, hearing, experience, etc... any of the aforementioned circumstances, I must report it to the OEO (I am not allowed to tell anyone else) who will then contact you. However, if you would like a confidential listener, you may contact the counselors at the Counseling Center (801-581-6826), chaplains at the hospital (50 North Medical Drive), the Women’s Resource Center (801-581-8030), the Victim Advocates (801-581-7779), Rape Recovery Center (801-467-7281), or the OEO (801-581-8365). However, if you do choose to disclose to me, then I must contact the OEO. After I contact the OEO, you are given the option as to whether or not to follow up with a formal complaint/investigation.

- **Wellness Statement**

- Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at their website ([www.wellness.utah.edu](http://www.wellness.utah.edu)) or 801-581-7776.

- **Classroom Social Equity**

- I strive to be ethical, kind, fair, inclusive and respectful in my classroom and expect students to behave likewise. In this regard, I have these requests of you, my student:
  1. Please do tell me, discreetly, if you have any sort of anxiety disorder, TBI, PTSD, C-PTSD, or any other challenge that would cause psychological harm to you by me calling on you in class. I want students to feel a little uncomfortable and stretched during class, while working on problems as a large group, but I definitely don’t want to cause any human being harm. So, please discreetly tell me if that is the case for you and I will confidentially accommodate your request.

2. If your preferred name is different than your legal first name (the preferred name you chose does indeed show up in CIS on my roll sheet, but not yet in Canvas), please log into Canvas and go to Account (on far left)→ Settings and change your Display Name to be the name you prefer to be addressed by. This will help me greatly to know students' names, and to address you correctly when responding to Canvas comments/discussions.
3. If there is ever a time that you feel this course or the curriculum is not equitable, please email me or meet with me to discuss your concerns so I have a chance to address that.
4. If you'd like, please let me know through writing, or in person, your preferred name and/or pronoun. In return, if someone discloses their personal pronoun to you/the group, I expect that you respect their identity and maintain a safe learning environment. You may not understand it, but you must respect it. I will not tolerate disrespectful behavior (see below).

- **Classroom Respect**

- I kindly demand respectful behavior in my classroom (think benevolent dictatorship). Examples of disrespect include, but are not limited to, reading a newspaper or magazine in class, social chatting with your friend in class, text-messaging during class, excessive use of your cell phone, or cuddling with your partner/friend in class. If you choose to be disrespectful with distracting behavior during our class, please keep in mind that you put me in a position of choosing between protecting/taking a stand for you OR for the other students or myself whom you are disrupting. I can guarantee I will choose to stand for the students who are there to learn without disruptions and I will thus take action to terminate your distracting behavior, and that action may not be desirable for you. If you do not stop your disruptive/disrespectful behavior, I will leave the classroom, ending our class session early that day, and there will most likely be a quiz during the next class.

- **Classroom Structure**

- A lot of educational research is showing that if I lecture, stand up at the boards and work problems, then you kind of learn nothing. You may prefer this structure, and research, along with personal experience, says that is because it is physically and mentally easier on you (as you are doing nothing, except *maybe* taking notes). Consequently, here's how class is going to work: you will read the relevant chapters (see the section pertaining to homework) before each Monday session for the upcoming week. During each class session, we'll spend the first 25 minutes answering questions and the remaining 25 minutes in groups working out examples problems in groups of 3 or 4 and answering any questions that arise. After each problem, I'll ask a group to explain their solution to the rest of the class. Please note you may not end up completing these exercises in class and that's okay (expected, even). The in-class questions should be prompting further questions you didn't know you had. This, of course, is the general structure. Keep in mind, I may alter this throughout the semester to fit our needs.
- In order to expedite the question answering process, I ask that you post any questions you have in Canvas under the "discussions" section under the thread for the corresponding week. If you have the same question as someone else and it is already posted in the

discussion thread, then simply post a response to that question (that way I can see which questions are common and which ones are not). I will then try my best to cover all the questions (going from most common to least common) in the allocated class time. If there are not questions on the discussion thread, then we will do the typical raise-your-hand-in-class method. If there are no questions, then we will skip straight to doing problems in class. COMPLETE LECTURE PERIODS IN THIS CLASS WILL BE RARE.

- Because we will be working in groups, let’s make sure we have good group communication! Please note, again, the following list is non-exhaustive.
  - \* Please make sure everyone is sharing their opinion! No bulldozing! Extroverts, make sure you get the introverts talking. Introverts, make sure you keep those extroverts in check.
  - \* Make an effort to learn everyone’s name. You could make a friend, hiking buddy, or study buddy!
  - \* Keep the conversations relevant to the course material and respectful. If you are having problems with a group member, please let me know. You may be as discreet as you’d like when doing this.

- **Succeeding in Class**

- Please make sure you do your best throughout the semester, knowing the grading scheme and what’s expected of you, and come talk to me if you need further study strategies. I will be happy to brainstorm ideas to help you maximize your study strategies and improve your mathematical understanding. I will offer an extra credit opportunity on every midterm and final exam, to help make up for arithmetic or math grammar mistakes for which you lost points. But, I will not offer any additional extra credit at the end of the semester or any other way for you to improve your grade at that time. No exceptions. Please respect this and do not ask for special favors or extra credit or some way to get a higher grade (however you want to word it) when you realize you don’t like your grade. Your need to get into a certain program, or needing a specific grade for your work or scholarship or not wanting to upset whomever is paying for your college are all your own personal dilemmas that are truly separate from how I assign grades. If you email me at the end of the semester to suggest that you deserve a chance to get a higher grade, I will forward your email to the Dean of Students office so you can get properly counseled in how to behave professionally in an academic setting. The only way to “better your grade” by the end of the semester is to retrieve your final exam and look to see if you have any grading appeals. I’m happy to look over those and possibly give points back, if warranted.

- **Lodging Complaints**

- Hopefully this section is irrelevant throughout the semester! If you feel that I have disrespected you, not accommodated you, made you feel unsafe, have harassed you in any way, etc...please let me know! I will be more than happy to change my behavior and work with you to make class safe and/or accessible. I strive to create a safe learning environment for all students. With that in mind, please understand I am not perfect and I am trying.

- Though you can reach out to me, I understand confronting someone who has disrespected/offended/harassed/upset/hurt you can be difficult. So, in order to lodge a formal complaint against me (for my teaching, behavior, or class conduct), you may email Kelly MacArthur at [macarthur@math.utah.edu](mailto:macarthur@math.utah.edu); her office is located in JWB 218. Alternatively, you may contact my course coordinator, Jyothsna Sainath, at [sainath@math.utah.edu](mailto:sainath@math.utah.edu) or find her in her office in JWB 124. Both of these people will help you follow the appropriate procedures for lodging a formal complaint.

- **Incompletes**

- If something happens to you that is not an academic emergency that may interfere with academic work, then you may ask for an incomplete. There are strict guidelines that will be followed; please keep that in mind. Though incomplete grades are possible, me giving out an incomplete is *incredibly* rare.

- **Informal references**

- The main structure and layout for this syllabus makes use of Brian R. Hall's freely-available L<sup>A</sup>T<sub>E</sub>X syllabus template found on his [personal website](#).
- I have borrowed, modified, and directly copied various ideas and sections from Kelly A. Macarthur's syllabus found on her [personal website](#) for Math 1220, Fall 2018.

## Course Outline and Schedule:

The weekly coverage may change depending on the progress of the class. However, you must keep up with the reading assignments.

Mon, Aug 20	Syllabus, Class Expectations, and Quiz 0.
Wed, Aug 22	Chapter 1 Questions and Problems.
Fri, Aug 24	Chapter 1 Questions and Problems.
Mon, Aug 27	Chapter 2 Questions and Problems.
Wed, Aug 29	Chapter 2 Questions and Problems.
Fri, Aug 31	Chapter 1/2 Questions and Problems. HW 1 due: Ch. 1: 22,27,30,31; Ch. 2: 19, 22, 25, 28, 30, 44, 52. Quiz 1.
Mon, Sept 3	No Class
Wed, Sept 5	Chapter 3 Questions and Problems.
Fri, Sept 7	Chapter 3 Questions and Problems. HW 2 due: Ch. 2 16, 28, 29, 30, 32, 35, 36. Quiz 2.
Mon. Sept 10.	Chapter 3/4 Questions and Problems.
Wed. Sept 12.	Chapter 4 Questions and Problems.
Fri, Sept 14.	Chapter 4 Questions and Problems. HW 3 due: Ch. 3: 45, 47; Ch. 4: 16, 17, 18, 19, 20, 21, 26, 34. Quiz 3.
Mon, Sept 17	Chapter 5 Questions and Problems.
Wed, Sept 19	Chapter 5 Questions and Problems.
Fri, Sept 21	Chapter 5 Questions and Problems. HW 4 due: Ch. 5: 19, 20, 21, 32, 33, 37. Quiz 4.
Mon, Sept 24	Chapter 8 Questions and Problems.
Wed, Sept 26	Chapter 9 Questions and Problems.
Fri, Sept 28	Chapter 8/9 Questions and Problems. HW 5 due: Ch. 8: 17, 18, 20, 21, 24, 38; Ch. 9: 20, 21, 22, 25, 29, 36. Quiz 5.
Mon, Oct 1	Chapter 10/11 Questions and Problems.
Wed, Oct 3	Chapter 10/11 Questions and Problems. HW 6 due*: Ch. 10: 21, 24, 26, 38, 41, 43; Ch. 11: 14-20 (even), 26, 28, 36.
Fri, Oct 5	<b>EXAM 1</b>
Oct 7-Oct 14	<b>FALL BREAK</b>
Mon, Oct 15	Chapter 14 Questions and Problems. Quiz 6 (Ch. 10/11).
Wed, Oct 17	Chapter 14 Questions and Problems.
Fri, Oct 19	Chapter 14 Questions and Problems. HW 7 due: Ch. 14: 11, 12, 15, 16, 17, 18, 24, 26. Quiz 7.
Mon, Oct 22	Chapter 15 Questions and Problems.
Wed, Oct 24	Chapter 15 Questions and Problems.
Fri, Oct 26	Chapter 15 Questions and Problems. HW 8 due: Ch. 15: 20, 21, 22, 23, 24, 30, 32, 41. Quiz 8.
Mon, Oct 29	Chapter 18 Questions and Problems.
Wed, Oct 31	Chapter 18 Questions and Problems.
Fri, Nov 2	Chapter 18 Questions and Problems. HW 9 due: Ch. 18: 16, 19, 29, 30, 33. Quiz 9.
Mon, Nov 5	Chapter 19 Questions and Problems.
Wed, Nov 7	Chapter 20 Questions and Problems.
Fri, Nov 9	Chapter 19/20 Questions and Problems. HW 10 due: Ch. 19: 16, 17, 25, 26, 32, 33; Ch. 20: 32, 34, 38. Quiz 10.

Mon, Nov 12	Chapter 23 Questions and Problems.
Wed, Nov 14	Chapter 23 Questions and Problems.
Fri, Nov 16	<b>EXAM II</b>
Mon, Nov 19	Chapter 23 Questions and Problems. HW 11 due: Ch. 23: 30, 32(b), 38, 42. Quiz 11.
Wed, Nov 21	Chapter 25 Questions and Problems.
Nov 22-Nov 25	<b>THANKSGIVING BREAK</b>
Mon, Nov 26	Chapter 25 Questions and Problems.
Wed, Nov 28	Chapter 25 Questions and Problems. HW 12 due: Ch. 25: 15, 16, 28, 30, 37, 39. Quiz 12.
Fri, Nov 30	Project questions, comments, and concerns.
Mon, Dec 3	Project questions, comments, and concerns.
Wed, Dec 5	Project due. <b>Last day of class.</b>
Tues, Dec 11 2pm-2:50pm	<b>FINAL EXAM</b>