

Methods in Empirical Analysis, Course Calendar

CSCE 5310, Spring 2022 at University of North Texas

<https://www.biomed-ai.com/class>

Important links: [SYLLABUS](#), [Academic Calendar](#), [zoom](#) (intermittently used)

All items are tentative until class time on the indicated day

Dates	Topic	Course expectations	Tutorials / readings
Jan 18	Class intro, Whirlwind tour of stats [slides] [video] - limited audio]		
Jan 20	Empirical Analysis class overview: syllabus (link at top), calendar. Finishing the tour. Programming expectations.	Canvas Quiz #1: Stats whirlwind tour (optional: AI discord [link])	Stats “take home” messages [pdf] , Example stats test flowchart [pdf] . Seltman chapter 1-2 [pdf]
Jan 25	Statistical test case study: t-test and assumptions [seltman slides 6]	Canvas Quiz #2: t-test and basic assumptions of stats tests	Seltman chapter 6 [pdf] . Skip any SPSS-specific material. (optional: t-test [wiki])
Jan 27	One-way ANOVA [seltman slides 7]	Canvas Quiz #3: ANOVA basics	Seltman chapter 7 [pdf] (optional: one-way ANOVA [wiki])
Feb 1	Best practices validating ML in medicine. (optional: Parkinson’s validation in ML (work in progress) [slides])	Canvas Quiz #4: Best Practices applying ML in Medicine [canvas] HW #1 : Job ad keyword search (past examples: ML [slides1] , [slides2] , mobile/java/web [slides])	Best practices paper [html] [pdf] (optional Tapia Panel video [mp4] [semi-live session info])
Feb 3	CLASS CANCELED DUE TO WEATHER CLOSURE		
Feb 8	Exploratory data analysis, univariate methods. Research Design slides [slides]	Canvas Quiz #5: Exploratory data analysis [canvas] Canvas Quiz #6: Research Design principles [canvas]	Seltman chapter 4: EDA [pdf] [highlights] Seltman chapter 8: Experimental design [pdf] [highlights]
Feb 10	Data visualization and multivariate methods [slides]		Data Visualization notebook Data Frames notebook
Feb 15	Resampling methods [slides 1-54]	Canvas Quiz #7: Resampling methods [canvas]	Resampling [wiki] and [Berger introduction] (optional: Resampling Methods in Comp Methods in Stats [link] ,

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			and Resampling methods chapter [pdf])
Feb 17	Cross-validation methods and examples [slides 55-67] and also these [slides]	Canvas Quiz #8: Cross-validation methods [canvas]	Cross-validation [sklearn] [wiki]
Canvas quizzes to prepare for Exam 1: All now available on CANVAS Canvas Quiz #1: Stats whirlwind tour Canvas Quiz #2: t-test and basic assumptions of stats tests Canvas Quiz #3: ANOVA basics Canvas Quiz #4: Best Practices applying ML in Medicine (previously given) Canvas Quiz #5: Exploratory data analysis Canvas Quiz #6: Research Design principles Canvas Quiz #7: Resampling methods Canvas Quiz #8: Cross-validation methods			
Feb 22	Data visualization 2: Making publication quality figures Review for Exam 1	Today's material will not be on exam 1	Creating publication quality figures [gDoc] 10 rules for better figures [pdf]
Feb 24	*** CLASS CANCELED DUE TO WEATHER CLOSURE *** The exam has been rescheduled for Thursday, March 3rd		
Mar 1	Optional lecture (will not be tested on) prior to exam. Example application: Dimensionality reduction in understanding neural coding [slides] [Urs 2021 paper]		
Mar 3	EXAM 1 - rescheduled: In classroom, bring your laptop as a portion of the exam will be online, but to be taken during class time. (contact Dr. Albert prior to class for alternate accommodations)		
Mar 8	Discrete probability distributions overview - Binomial / Multinomial, Hypergeometric, Geometric, Negative Binomial, Poisson [slides]	Canvas Quiz #9: Discrete probability distributions [canvas]	Seltman section 3.9 for a brief overview [PDF] . (optional: common prob distributions [link]) Overview goals: focus on which distribution is appropriate for a given situation, how to use the CDF if given, and any direct comparisons between functions.
Mar 10	Simple continuous Probability Distribution overview - multivariate normal, t, F, exponential, Gamma, Chi-Squared [slides]	Canvas Quiz #10: Continuous probability distributions [canvas]	Overview goals: focus on which distribution is appropriate for a given situation, how to use the CDF if given, and any direct comparisons between functions.
Mar 15 & 17	HAVE A GREAT SPRING BREAK!!!		
Mar 22	Nonparametric testing methods 1 [slides] - 1-37 only]	New point distribution update to syllabus - 3 exams now required, best 3 of 4.	You should be able to choose the appropriate test using this chart [pdf] (which will be available during exams)

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Mar 24	Nonparametric testing methods practice in-class	HW#2 : Stats word problem creation Canvas Quiz #11: Nonparametric testing methods [canvas]	Tests covered include: Chi Square [wiki] , Fisher's Exact [wiki] , McNemar [wiki] , Sign test [wiki] , Wilcoxon signed-rank [wiki] , Mann-Whitney U [wiki] , Kruskal-Wallis [wiki] , Friedman [wiki]
Mar 29	Simple linear regression [slides]	HW#3 : Final project brainstorming assignment (due BEFORE class april 5th) Canvas Quiz #12: Linear regression [canvas]	Seltman chapter 9
Mar 31	Statistical power [slides]	Canvas Quiz #13: Statistical power [canvas]	Seltman chapter 12 (12.1 - 12.3 only)
Upcoming canvas quizzes to prepare for Exam 2. To be released by Sunday, April 3rd (note, the exam is cumulative, and these do not represent all areas studied): Canvas Quiz #9: Discrete Probability Distributions Canvas Quiz #10: Continuous Probability Distributions Canvas Quiz #11: Nonparametric testing methods			
Apr 5	Project selection in class [shared doc] . Bring laptops. If you can't come, have someone pick for you. HW#4 : Final project proposal		
Apr 7	EXAM 2 (please complete your canvas quizzes before taking the exam): In classroom, bring your laptop as a portion of the exam will be online, but to be taken during class time. (you must contact Dr. Albert prior to class for alternate accommodations) Exam Seating Chart		
Apr 12	ANCOVA [slides]	Working on project in class with any time remaining	Seltman chapter 10
Apr 14	Two-way ANOVA [slides]	Canvas Quiz #14: ANCOVA and two-way ANOVA [canvas] There will be significant time in class to work together on projects and ask for feedback. Update to the syllabus & calendar discussed	Seltman chapter 11
Upcoming canvas quizzes to prepare for Exam 3. To be released by Sunday, April 17th (note, the exam is cumulative, and these do not represent all areas studied): Additional note: these canvas quizzes will use the Respondus Lockdown Browser. It is critical that you take the quizzes before the next exam to assure your system is configured for it, since the next exam will also be administered using the lockdown browser. Canvas Quiz #12: Linear regression [canvas] Canvas Quiz #13: Statistical power [canvas] Canvas Quiz #14: ANCOVA and two-way ANOVA [canvas]			
Apr 19.	Categorical outcomes [slides] ,	HW#5 : Final project presentation video and report slides [due Apr 29th]	Seltman chapter 16.1-16.2 Logistic regression [slides]

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	Feedback on class grading [snapshot]		
Apr 21	EXAM 3: Will be using the Respondus Lockdown Browser - take one of Canvas quizzes #12-15 to assure it works on your laptop. In classroom, bring your laptop as a portion of the exam will be online, but to be taken during class time. (you must contact Dr. Albert prior to class for alternate accommodations) EXAM 3 Seating Chart (different from last exam)		
Apr 26	Stats word problem section description and review [review slides] [example problems] Job keywords overview [10 mins, slides]	Practice for new section of stats word problems for future exams - including tomorrow's	In class exercises will be given as summary reviews of the material over the semester - similar in style to earlier homework.
Apr 28	EXAM 4 Seating Chart - different from last exam. Please check your seat assignment EXAM 4: Will be using the Respondus Lockdown Browser. In classroom, bring your laptop as a portion of the exam will be online, but to be taken during class time. (you must contact Dr. Albert prior to class for alternate accommodations)		
Apr 29, Friday	All late assignments, canvas quizzes, and final projects due on this day. NO EXCEPTIONS. Only preparation for the final beyond this point in the course.		
May 3	Course review lightning presentation [slides - over 140!] . Grading wrap up [current snapshot] & Final words. Reminder of special final start time.		
May 5	Final project presentations - some of the better recorded presentations played in class, celebrated, and discussed, as well as notable departures from proper statistical analysis . Groups to be presented: 1, 3, 15, 35, 21, 24, 26, 30		
10:30am - 12:30pm May 10	EXAM 5 Seating Chart - please check your seat assignment EXAM 5: Will be using the Respondus Lockdown Browser. In classroom, bring your laptop as a portion of the exam will be online, but to be taken during class time. (you must contact Dr. Albert prior to class for alternate accommodations)(Note the policy of dropping lowest exam grade) Note alternate time, 10:30am-12:30pm, Tuesday, May 10th		