STAT 327-1 (also -4 and -7): Introductory Data Analysis with R

Course outcome: Students will use R to manipulate data and perform exploratory data analysis using introductory statistics.

Unit	Objectives Students will:	Assessment	Read, View, Do
1 **Build basic R vocabulary**	1. Use R as a calculator. 2. Use Rs distribution functions: calculate probability mass/density, cumulative probability distribution, and quantile functions and generate random numbers. 3. Run a line of R code in the console and a batch from a script. 4. Use R Markdown to write reports integrating text, data, R code, and its output.	Q1 HW1 (trivial script) (Q = online quiz, HW = homework)	1calculator.pdf, lecture 1
2 **Maniuplate data in R**	1. Manipulate data to create vectors, lists, and data frames. 2. Summarize a data set. 3. Select a subset of a data set. 4. Use a factor vector for categorical data. 5. Load clean tabular data sets into R. 6. Save R data sets as text or csv files.	Q2, Q3, Q4 HW2 (donations to 2012 elections), HW3 (Boston housing)	2vector.pdf, lecture 2 3list.pdf, lecture 3 4dataFrame.pdf, lecture 4
3 **Produce graphics**	1. Use the graphics base package to create displays of data: scatterplots, boxplots, histograms and density plots. 2. Customize graphical layout, annotations, and legends.	Q5 HW3, HW4	5graphics.pdf, lecture 5 group work (graphics)
4 **Apply statistical methods**	1. Run classical statistical procedures including confidence intervals, t tests, Z tests for proportions, F tests for variance, and χ^2 tests. 2. Do basic linear regression analysis and ANOVA.	Q6, Q7 HW4 (test, regression, confidence bands)	6test.pdf, lecture 6 7regression.pdf, lecture 7 8simulation.pdf, lecture 8 group work (tests)
5 **Run basic simulations**	1. Replicate a calculation to simulate properties of distributions. 2. Simulate data fitting $N(0,1)$, t, χ^2, and F distributions.		8simulation.pdf, lecture 8
		Written exam	

Prerequisite: Introductory statistics