REVIEW FOR EXAM 2

Block 2 Understanding and Performing the Fundamental Epidemiological Analyses

READINGS:

Lecture 12:
ACSM Research Methods: Chapter 4 (51-72)
ACSM Research Methods: Chapter 17 (305-323)

Lecture 13:
ACSM Research Methods: Chapter 2 (9-26)

Lecture 14:
ACSM Research Methods: Chapter 8 (143-160)
ACSM Research Methods: Chapter 19 (343-356)

Lecture 16:
Epidemiology 101: Chapter 3 (45-62) *Second Edition: Ch. 4*

TOPICS:

What is science? Why is science important?

What is the purpose of research? What's a good place to start with research?

What are the qualities of an effective research question?

Understand the differences between observational and experimental research.

What makes a cohort study different from a case-control study?

Know the types of questions epidemiology is appropriate and inappropriate to answer.

Is every published article trustworthy? How would you find reliable articles to learn about a scientific subject?

What's GIGO? Why is it important? What have we learned about industry-funded research?

Accidental vs. deliberate bias. Systematic vs. random errors.

Variables. Know everything about them. Dependent variables (which largely define which statistical model to use) and independent variables (or "predictors" in regression models). Confounding, moderator, and mediator variables. Nominal, ordinal, interval and ratio data. Categorical variables (e.g., binary) vs. "scale" (discrete and continuous). Between-group and within-group variables.

Univariate and multivariate analyses.

Internal and external validity.

Have a clear understanding of what a null hypothesis is. And Type I and II errors.

Know what a histogram is. And what skewness and kurtosis mean in that histogram. Recognize pictures and know whether those pictures correspond to positive or negative excess.

Understand variance and standard deviation (you won't need to calculate them, but you'll need to know a fair amount of detail about what they are; for example, is there a difference between sample and population standard deviations?).

Measurements of central tendency (mean/median/mode) and which is most appropriate to report in various circumstances.

Historical perspective: Fisher, Gosset, and Pearson. Who are they?

Know p-values. *Really* know p-values. All the details. No room for error.

Correlations. What's the difference between a Pearson correlation coefficient and a point-biserial correlation? What range of correlation is strong-ish? What range is weak-ish? What's no correlation at all? What's a perfect correlation? Positive and negative?

Be able to read and interpret a "Table 1"; know what analyses are used to calculate each value in the table.

What's the point of doing "Explore" statistics on variables, and looking at the Q-Q plots and tests of normality?

Sensitivity and specificity. Know these. And also know the ROC space (what its x and y axes are, and be able to interpret points plotted in that space).

Management of outliers: what are some rules to consider?

What's representative sampling? And convenience sampling?

Understanding of what a T-Test is measuring. Independent-samples vs. paired-samples?

Understanding of what a regression is measuring (both linear and logistic).

Be able to identify the most appropriate statistic to use in various situations. In other words, know how to apply statistics to answer a variety of different questions.

Be very, very proficient in reading outputs for descriptives, frequencies, chi-squared tests, independent-samples t-tests, paired-samples t-tests, bivariate correlations, and linear and logistic regressions. Really understanding the meanings of what you're reading.