CEWA 565 Data Analysis in Water Sciences, 4 units **Fall Quarter 2019**
SLN 12146 (CEWA 565A) and SLN 12147 (CEWA 565B)

Course Project

The goal of the course project is to give you hands on experience dealing with data of particular interest to you, as well as experience writing about and presenting data and statistical information. Ask and answer a question (pose a hypothesis), using a variety of analysis techniques, and clearly address the statistical uncertainty of the answer. Explain your objectives, your data source, your methodology, and your results. Discuss remaining uncertainties. Project will consist of an oral presentation (20% of total) and a written report (80% of total), which will be no longer than 10 pages, including figures.

Sources of help:

UW has services to help people with statistics (https://www.stat.washington.edu/consulting/) and data analysis (http://escience.washington.edu/dss-hours). These are designed primarily to help graduate students engaged in research (not struggling with homework), but presuming your course project is related to a research interest of yours, they have been very helpful in the past.

Potential projects to choose from:

You are welcome to use your own data and answer a question of interest to you – please let the instructor know as early as possible so that we can make sure you have sufficient data to be successful. Alternatively, you may choose one of the projects below. (Note: Multiple groups may answer the same general question, but they should pick different specific data or specific tests to use, which can be coordinated in conjunction with the instructor.)

1) How does forest harvesting affect flooding? Using data from the HJ Andrews experimental forest, determine whether the risk of flooding has increased following forest harvesting. You may download timeseries data from the class webpage or from the HJ Andrews page (http://andrewsforest.oregonstate.edu/lter/). Watershed 1 was a 400 to 500 year old growth forest, measured from 1953-1961; from 1962-66, it was 100% clearcut, and in 1967, it was burned. Watershed 2 was kept as a control during this time. (See watershed details here: http://andrewsforest.oregonstate.edu/lter/research/component/hydro/ws_desc_tbl.gif). Using a variety of techniques we learned in class, as well as others you may encounter in the literature (at least 3 different total tests), determine whether forest removal increases flood risk at different return intervals in the HJ Andrews area. What is your confidence in this (Type I and Type II errors)? How sensitive are your results to the statistical tests you chose?
2) Similar to question 1, you may want to use the same dataset but focus on how forest regeneration (following harvesting) changes summer streamflow, or low flows. See Perry and Jones 2017 paper on this topic: https://onlinelibrary.wiley.com/doi/full/10.1002/eco.1790
3) People have talked about stream temperatures being unhealthy for fish if snow melts earlier (resulting in earlier streamflow). How does stream temperature in different months and different streams relate to the onset date of snowmelt runoff (when the streams start rising)? You may download time series of discharge and stream temperature here: http://depts.washington.edu/mtnhydr/data/yosemite.shtml for different streams in Yosemite National Park, California. Using a variety of techniques we learned in class, as well as others you may encounter in the literature (at least 3 different total tests), determine whether stream

temperature is significantly changed by streamflow timing. What is your confidence in this? You may want to consider different months of the year or different times of the day (e.g., daily maximum temperature vs. daily mean), and you may want to compare and contrast streams of different sizes. (See the "Guide" under "Supplemental Material" to learn more about these sites. Also, talk to Professor Lundquist if you want data through summer 2018.)

4) Does snow accumulation and/or melt change after forest disturbance? How? (Please see Professor Lundquist if you're interested in this project.)

Grading Rubic for Oral Presentation (for total of 30 points):

A powerpoint-type presentation, like you would expect at a conference, 10 minutes in length, with an additional 5 minutes for questions. Your classmates are your audience. Present your question, why it is important, what methods you employed to answer the question, your major results, and the implications of your results. For pairs, both partners must present.

I. Clarity of Overall Presentation (P: 1-10 points)
   a. Clear statement of the problem
   b. Clear explanations of what you did, easy to follow
   c. Good transitions from one section to the next
   d. Ability to answer questions

II. Quality of Visual Aids/Graphics (V: 1-10 points)
   a. All graphics easy to see, properly labeled, large font
   b. Correct limits on the axes to show relevant information
   c. Proper choice of type of graph to convey information
   d. Interest level – slides nice/interesting to look at

III. Technical Analysis and Discussion (T: 1-10 points)
   a. Proper methods applied
   b. Accuracy of results
   c. Explanation of why results are what they are
   d. Ability to relate results to other studies and other presentations in the class

Grading Rubic for Written Report (for total of 30 points):

For the written report, you must include an abstract (no more than 300 words) and a list of references; these can be in addition to your 10 pages. Follow the same format outlined for the presentation but feel free to include more details (equations, etc.). Please address any questions or comments that were raised during the oral presentation. Use clear, concise sentences and proper grammar.

I. Quality of Writing (W: 1-10 points)
   a. Clear and easy to read
   b. Proper grammar and spelling
   c. Clear statement of the problem
   d. Good transitions from one section to the next
   e. Clarity of explanations of what you did

II. Technical Analysis (T: 1-10 points)
   a. Clearly described methods, proper literature cited
   b. Technical difficulty of methods applied

c. Accuracy of results

III. Interpretation, Analysis, and Discussion of Results (A: 1-10 points)

a. Attempted to explain why certain patterns were observed in the data and/or analysis

b. Thought about results in context of other studies

c. Outlined next steps to be taken

d. Addressed underlying assumptions in the analysis and how these may have affected results