1. Who is involved in your study? (list all group members)

John Shuler, and only John Shuler.

2. In a general sense, what is the topic you plan to study?

Evolution of and the relationship between soil moisture and soil water tension over the course of a growing season. If I get extracted water samples analyzed in time, I may try to incorporate soil stable isotope data.

3. Identify any key references or articles you will need to read in order to complete your study?

MM Gribb, I Forkutsa, A Hansen, DG Chandler, JP McNamara. (2009) The effect of various soil hydraulic property estimates on soil moisture simulations. Vadose Zone Journal 8, 321-331

Roshani, P. & Sedano, J.Á.I. Incorporating Temperature Effects in Soil-Water Characteristic Curves Indian Geotech J (2016) 46: 309. doi:10.1007/s40098-016-0201-y

Malaya C, Sreedeep S (2011) Critical review on the parameters influencing soil-water characteristic curve. J Irrig Drain Eng 138(1):55–62

4. What type of data will you be modeling or analyzing? (e.g. time series, spatial maps)

Time series of soil moisture and soil water tension gathered summer 2016 in Dry Creek Experimental Watershed. Possibly stable isotope data from soil samples gathered over the same time period.

5. What are the inputs and outputs of your code?

Inputs:

- **Time series data of soil moisture and soil water tension (.dat files)**
- **Isotope data from soil profiles sampled every ~two weeks over the same time period**

Outputs:

- **Processed time series of soil moisture of soil water tension: missing values interpolated, etc.**
- **Moisture release curves/characteristic curves for four depths in a soil profile**

6. How will you know if your code is correct? (e.g. can you compare with existing results?)

I can compare the generated moisture release curves to those established for soil types similar to those at each depth. Characteristic curves all seem to follow a general trend: increasing tension with decreasing soil moisture. If my outputs seriously deviate from this, I either have bad data or coding errors, or both.

7. What type of logic will your code use? (e.g. for loops, if,else statements, etc.)

- **If/else statements will enable me to filter data above/below certain values, if necessary**
- **Some logical indexing may be necessary for locating NaN values.**

8. How will you present the inputs and outputs? (e.g. 2D plots, histograms, etc.)

The time series inputs will simply be displayed as 2-D plots.

The characteristic curves will also be displayed as 2-D plots, in various forms. Ideally, an animation or colormapped line can be used to define hysteresis in each curve.

9. What is the significance of the output data? (e.g. how can it be analyzed or used)

Provided the raw data is useful, the generated moisture release curves can be used to characterize hysteresis related to wetting and drying conditions. These curves can be used to predict how a soil layer will release water during the summer dry-down, whether due to evaporation or uptake by plants.

10. Are there any parts to your project that you currently do not know how to accomplish or implement? Which parts will you need help from me, if any?

- **I have interpolated using Matlab before but I will definitely need a refresher and perhaps some guidance re: how much missing data is considered too much to use interpolated values for.**
- **I may need to correct my data for temperature. The Roshani and Sedeno paper should help with this.**
- **Dr. Mikesell referred to a couple plotting techniques that will be perfect for displaying the moisture release curves. I'll need to learn these.**