CEE6440 Final Exam Fall 2004
GIS in Water Resources

There are three questions on this exam. Do all three questions. For the first two questions, prepare a 2-page typed theme paper. For the third question use ArcGIS to prepare the map and answers requested. *Staple all three solutions together in the order of the questions*, and turn in the result to the CEE secretary in EL211 by 5PM on Friday, December 10. This is a take-home exam. You are honor bound not to discuss this exam with your colleagues in the class. Your answers should be the result of your work and thought alone. Be assured that if essentially the same idea appears in answers from more than one person, it is fairly easy to recognize that when the grading is being done. If that happens, it is not clear from whom the idea originated and who is just using somebody else's knowledge. So, keep your ideas to yourself!

The term papers that you choose to describe in answering Questions 1 and 2 should be mutually exclusive, that is, if you focus on particular term papers in answering one of the questions, don't focus on the same papers when answering the other question. The Texas class term project listing can be found at: http://www.ce.utexas.edu/prof/maidment/giswr2004/docs/TermProjList.htm. The Utah class term project listing can be found at: http://ceefs2.cee.usu.edu/giswr/students.html. You can use projects from either location in preparing your answers.

What I am looking for in grading your answers to the first two questions is:

- **Knowledge of the facts.** Make sure you lay out the facts of what has actually been done before you start offering opinions about what could have or should have been done. This particularly applies to the discussion of term papers. Make sure you discuss what was actually done in the term paper not just about the general subject itself.
- **Thoughtful evaluation.** How do you evaluate the advantages and limitations of the principles, methods and data that have been used? How does the knowledge you've learned in this class relate to the world around us? I am looking for a sense of reflection here, of seeing you set individual situations and facts in a larger context in an intelligent way.

Questions

1. Compare and Contrast Two Applications Dealing with the same Theme

Choose two term papers that deal with the same or similar themes or topics. Neither of these papers should be your own term paper. Briefly summarize the contents of the papers (the problem examined, the method of analysis, the results achieved). Compare and contrast the approaches to the problem that the two papers took. Which technical approach do you think was more effective? Why? Which paper does a more effective

job of communicating its results? Why? Suppose you were undertaking a study of this same subject. Having studied these two papers, what have you learned about how to go about your investigation effectively? What would you do differently from what the authors of these papers did?

2. Write an Assessment of the Utility of GIS in a Particular Application Area

Student term paper presentations have been grouped into various application areas e.g. surface water resources, hydrogeology, water quality, coastal and ocean issues, regional issues. Take one of these subject areas, or another of your choosing, and present a critique of how effective GIS is in its application in this subject area. What is the scope of the application area? How has GIS been used? What types of problems have been solved effectively? What limitations exist that have yet to be overcome in the application of GIS in this area? *In your answer, you must refer specifically to work presented in at least three term papers prepared in this course,* and preferably to more than three. In other words, I am not looking here just for a general statement about your opinions in the field but rather a deduction based on the term papers presented in this class of what has been done and how you judge the effectiveness of that.

3. Hydrologic Analysis

The zip file http://www.ce.utexas.edu/prof/maidment/giswr2004/docs/final.zip contains the portion of the digital elevation model from the San Marcos basin that you have used in class exercises covering Plum Creek. There are two stream gages within this DEM at the following locations

Name	Latitude	Longitude
Plum Creek A	29°55'28"N	97°40'48"W
Plum Creek B	29°49'42"N	97°35'6"W

(NAD 1983 horizontal earth datum).

Use the skills you have learned in this class to do the following
a) Prepare a layout showing the DEM (including a scale bar and indication of North). Show in this layout each gage and its watershed. Also include in this layout DEM derived streams (from either ArcHydro or TauDEM).
b) Determine the total drainage area upstream of each gage (in square kilometers)
c) Determine the flow distance along the streams from the upstream to the downstream gage (in kilometers).

In addition to the layout and numerical values you have reported include a brief narrative (less than 1 page) explaining the steps you used to obtain your results.

The DEM is in a NAD 1983 Albers projection. The gage coordinates are relative to the NAD 1983 horizontal earth datum.