**ISyE 6333, ORI for MS SCE**

**Disaster Response Case Study  
Dr. Julie Swann, Fall 2016  
Due Date: Tues Nov 15 (model & initial numbers), Thurs Nov 17 (final)**

**Medical Response**

After graduating from Georgia Tech, you are hired by the Federal Emergency Management Association (FEMA) to work in their Puerto Rico division. Upon your arrival, you are placed in charge of all preparedness plans related to emergency medical services. However, as you talk to all your coworkers, you realize FEMA doesn’t have proper plans for emergency medical services following a large scale disaster! Now, it’s your job to find out what is needed and begin drafting the proper plans.

Realizing you now have countless lives relying on you for a proper response, you begin to search for methods of solving this problem. Speaking with your supervisor, he tells you they have already created a list of the 56 health facilities in the country including the number of beds in each facility and their locations. Time to get started!

Along with the information you already have, what other information would help you plan for a disaster situation?

Now that you have thought through possibilities for your disaster plans, you realize you also need to know where all the people are. Luckily for you, one of your friends works in the Census Bureau and is willing to give you the entire population of Puerto Rico broken down into each census tract along with the location of the center of each census tract. Now you know where all the people are, but you’re still struggling to determine how many of these people would need medical attention. Does it make sense to assume everyone needs medical attention? Luckily, your supervisor tells you another FEMA group has a tool called HAZUS. With this tool, this group can input a disaster situation, such as a earthquake, and run the tool to give you an estimate for the percent of each census tract that needs medical attention for that disaster. To get you started and show you what they are capable of, the team has already run a disaster scenario for you. They have inputted a magnitude 8.0 earthquake 45 km off the coast of San Juan, Puerto Rico’s capital and given you the resulting data. Given this information, you set out to determine what kind of medical response preparedness plans are best for Puerto Rico by analyzing the current capacity of the medical system to respond. Answering the below questions may help you in evaluating this capacity.

1. What can you determine given the locations of each hospital and the locations of the people?
2. What would happen if everyone went to the same facility? Is there a way to determine in the model how many people go to the different facilities? How?
3. What items can be maximized or minimized here?
4. How would you estimate how many people need medical attention if HAZUS were not available? Would the constraints look any different?

Use the information from these questions to write an optimization model to help you evaluate the response capacity of Puerto Rico’s medical infrastructure. Then, run this model for at least two different scenarios to see what differences may exist in different situations. Do you notice anything similar or different between the runs? Was there anything you expected? Did you see any results different than you expected? Finally, discuss what you learned about the capabilities of Puerto Rico’s medical infrastructure.

Instructions:

You may work in teams of up to 2 students. You should turn in a report that details your model, the solution process for the model, any sensitivity analysis performed, and the answers to the above questions. Grades will be based partly on the “what-iffing” done, and the thoughtfulness in the answers to the above questions. In addition to the summary group report, each student should write a personal statement detailing their contribution to the work content (including the engineering contributions, and communication, etc.).

Report Notes:

1. Professionalism is foremost in the report. Write until you decide that you have done your best given the time constraints for your team. Brevity and conciseness are also appreciated. Your name is on the front cover of the report so make sure that you are happy with the work.
2. Please include material on any assumptions that you make. You must justify all assumptions and state how you use the assumption in the analysis. You may clarify issues with the instructor.
3. Please define any notation that you use and clearly explain any models that you formulate. Do not assume that the reader is all-knowing, but you may assume that the reader has knowledge of this course material.
4. You may make use of appendices, but you MUST discuss this material in the body of the text!
5. Besides the above key issues that are required, please include any sensitivity analysis and duality analysis that you do. These really help strengthen your case. You will be partially graded on the strength of your argument and how well you convince the reader of the quality of your solution.
6. Please document all sources that you use. You do not have to document any conversations you have with the instructor.