### Name:\_\_\_\_\_\_\_\_\_\_\_\_\_

**Application Engineering and Development INFO 5100**

# FINAL Exam

## Saturday April 28, 2012

## Start Time: 2:00 pm

## End Time : 5:00 pm

**Health Information Exchanges** will have a huge impact in coordinating care at multiple levels within the Boston health centers and beyond. Participants in a patient’s care will suddenly become connected and able immediately to have access to vital information. Caregivers will not have to make a big effort to find out their patient’s medical history; emergency room doctors will have the information they need immediately; pharmacists too will be easily and quickly informed of drug adherence issues. Mistakes will be avoided, and in the end more intelligent decisions about how to go forward with the patient’s care will be able to be made. This system is not simply a way of keeping (dead) records. It is instead a dynamic network that will energize and render super-efficient the medical environment and all the arenas it touches upon. By efficiently providing a full profile of the patient, this system will quickly move caregivers to the level of fully informed analysis. It will activate communication lines so that diagnoses and actual work on the patient—that otherwise would not have surfaced as possibilities—will exist and be performed.

Your task is to give clear answers to the following questions.

1. In the Boston Area we have hospitals like Mass General (MGS), Children Hospital, Brigham and Women’s (BW), Boston Medical Center, Each of these hospitals have provide patient care and in addition they provide emergency room services (ER). Pharmacies in the area are players as well. Outline and explain all the steps required for the design and implementation of a software system to facilitate the flow of patient data. In broad terms, you must describe the essential components that you will use to construct the system as well as key roles necessary to operate and use the system. Make any assumptions you deem necessary (for example, patient data reside in different database components but share the same data format).
2. Draw a complete model that will capture the structure (staff), behavior (work), and interconnectivity (collaborations) of the eco-system. Your model must support the construction of eco-systems of global scale.
3. Patient **electronic health record (EHR)** may include a range of data, including demographics, medical history, medications and allergies, immunization status, laboratory test order results, radiology images, vital signs, personal stats like age and weight, and billing information.
   1. Define an EHR model as we discussed in class. The model must capture the history of how the patient, over time, comes in contact with the healthcare system.
   2. How can a doctor express a request to refer a patient to a specialist?
   3. How would you extend the model to support billing and payments?
4. Write java programs to show how patient info discovery and retrieval will work in the system you described in question 1? Assume that each site will have two kinds of services: one for discovering if a patient is a member of a clinic; the value returned will be null or the patient id. The second service will be a clinical data retrieval service where the clinical data will be returned based on the patient id. Define all the java classes you need to show the search and retrieval will work. You only need to define the critical algorithms to write the programs. For the some of the classes you might want to assume methods exist to provide the functionality you need without having to worry about their detailed implementation. This applies to methods that are not core to the search and retrieval algorithms. For example, a method to retrieve patient data from the database such as “getPatientData()” does not need to be implemented and sufficient to just invoke as need be. You will be graded on the accuracy of the logic, use of the models and classes we built, and not so much on the details of the java syntax.