Requirements specification:

A simulator which will simulate the operations of a theoretical emergency room in a town of 2000 residents. The program will take inputs for how many residents get sick each hour, how many doctors are on duty and how many nurses are on duty. The program will run the simulation each resident has a random chance of becoming sick which is dependent on a random number generator. After being selected as a patient a priority number is given to the patient and they are inserted into a priority queue called waiting room. Each tick in the simulation represents one minute, a maximum of one patient may be added to the waiting room each minute, and the emergency room will accept as many patients as possible each minute. If there are three providers free and there are three patients in the waiting room they will each be admitted into the ER in order of their priority number in the same minute.

The design uses three main data structures. An array in the town class which holds all of the residents. Each time a patient is added to the waiting room, a resident is chosen at random from this array. The second data structure is a priority queue in the waiting room class which holds all of the patients in the order of their assigned priority. A maximum of one patient can be added each minute. The third data structure is another priority queue in the emergency room class which hold all of the patients in order of how long their treatment will take. When the emergency room is updated any patients whose treatment time matches the current time will be removed from the hospital and their visit is recorded

UML:

Patient

Emergency room

Waiting room

Resident

Town