**ENGINEERING METHOD - TI 1**

**IDENTIFICATION OF THE PROBLEM:**

In this project we are asked, by a recognized Health Care Provider Institution, to make a first version of a system to manage the admission and discharge of patients in a Clinical Laboratory. This program will be executed by the staff located at the reception of the center who will be responsible for performing the admission process and then direct the person to one of the two current units of the laboratory (Hematology and General Purpose) with an assigned turn of attention. When a patient arrives at the laboratory they must be searched for, or entered if they are not in the system. The system should have an "undo" option each time an admission or discharge action is performed, to make it possible to correct these possible mistakes. Finally, the system must have a panel that allows monitoring the list of people currently in the laboratory at all times.

R1. The system should allow searching for a patient from the system database.

R2. The system must allow to register a patient in the system database. The patient's id, name, gender, age and priority will be saved.

R3. The system must allow to enter a patient in the queue of one of the two sections, hematology or general purpose.

R4. The system must allow to remove a patient from the queue of one of the two sections, hematology or general purpose.

R5. The system must allow undoing the queue entry or exit.

R6. The system must allow to review either of the two section queues.

**- GATHERING THE NECESSARY INFORMATION:**

To solve this problem, we will need to make use of data structures that allow us to store patient information in the system and also create a queue that is determined by the priority value.  Therefore we will make use of two abstract data structures, one is Priority Queue and the other will be Hash table. Priority queue is a type of queue in which each element has an associated priority value. This priority value is used to know the order in which the elements will be removed from the list. If two elements have the same priority value, they are removed as they entered the queue. In this project, this abstract data type will be used to simulate the queue per shift that we are asked to queue patients in each section. The priority value will be the priority that the patient has in terms of attention. For the operation of the Priority queue we will use Heap, an IPriorityQueue interface and a Node class.  On the other hand, the Hash table is a data structure that stores data associatively. In a hash table, data is stored in an array format, where each data value has its own unique key. Access to the data is very fast if we know the key of the desired data. In this data structure we will store the patients that are registered in the system, these will be the ones loaded in the database and the new ones that are registered directly from the program. For the operation of the Hash table we will use Chain hash table, an IHashTable interface and a Node class. The methods of both structures will allow us to develop the project more easily.

In addition to this, we will use a database made by us. This will be loaded with patients for the execution of the program. Patients that are registered directly in the program will also be saved in this database.

<https://www.geeksforgeeks.org/priority-queue-set-1-introduction/>

<https://www.geeksforgeeks.org/hashtable-in-java/?ref=gcse>

<https://www.geeksforgeeks.org/hashing-data-structure/?ref=gcse>

<https://www.tutorialspoint.com/data_structures_algorithms/hash_data_structure.htm>