

## **Medical Image Analysis**

### **ED 6001 Assignment -1**

- 1. Write Python implementations for the following operations (40 marks)**
  - a. Histogram Equalization**
  - b. Gradients of an image- along x and y directions- do not use in-built methods**
  - c. Convolution of an image and an impulse response function**
  - d. Image filtering using a Gaussian smoothing filter. To be performed in the spatial domain.**

**You should provide a Python script that executes all these methods on any test data. If the code fails to run you will not get any credit. Name the script main1q1.py**

- 2. Implement the Laplacian filter both in the spatial and frequency domain. (20 marks)**
  - a. You can implement the form of the Laplacian in the frequency domain as given in the book (Gonzalez and Woods).**
  - b. You can also start with a stencil of the Laplacian in the spatial domain and compute the corresponding frequency domain filter.**

**You can use Python methods for calculating the Fourier Transform. Name the Python script main1q2.py**

- 3. Show that the Laplacian operation is isotropic i.e. invariant to rotation.(10 marks)**
- 4. Provide a 3x3 mask for performing unsharp masking in a single pass through an image. (10 marks)**
- 5. The discrete derivative of an image is approximated by  $f(x+1,y)-f(x,y)$  where  $f(x,y)$  represents the image. Obtain the filter transfer function for performing the equivalent operation in the frequency domain. Show that it is a high pass filter.(10)**