Course Title: Programming for Medical Physics, Spring 2017

Instructor: Neil Kirby, Ph.D. kirbyn@uthscsa.edu

Material Requirements: This course will be taught entirely from handouts, but the student will need to acquire a student version of Matlab.

Prerequisites: A familiarity with the field of medical physics.

Credits and Class time: This course is 1 credit hour and meets one day a week for an hour.

Semester Offered: For now, just Spring.

Evaluation Scheme: Weekly programing projects, followed by a final programming project.

Course Outline: The purpose of the course is to demonstrate to students the usefulness of programing for medical physics. The Matlab programming language is chosen because it enables rapid coding and data visualization. Students will first be taught basic programming techniques. Then, they will be shown specific examples of these techniques being applied to medical physics. Finally, they will create a final program, which performs a task of the student's choosing and utilizes several concepts from the course. Students will be graded based on their attendance and programming projects (25% attendance, 50% weekly projects, 25% final project).

List of Weekly Topic:

1. Basic introduction to Matlab: command line, directory navigation, variables, data types, and manipulations.
2. Iterative loops – Scripts and an overview of iterative loop programming and alternatives within Matlab.
3. Introduction to functions – basics of function creation and data manipulations therein.
4. Plotting – an overview of data visualization and plot creation within Matlab.
5. Extracting spatial data from images, Part 1.
6. Extracting spatial data from images, Part 2.
7. Importing and exporting data, Part 1.
8. Importing and exporting data, Part 2.
9. GUI – an introduction of graphical user interfaces.
10. Fourier transformations – an overview of Fourier data analysis.
11. Dicom data.
12. Arduino programming, Part 1.
13. Arduino programming, Part 2.
14. Tomographic image reconstruction, Part 1.
15. Tomographic image reconstruction, Part 2.
16. Final project presentation – students will present their final programming projects to each other.