BMED/ECE 4783 Introduction to Biomedical Image Processing (Elective)

Catalog Description: BMED 4783 Intro-Medical Imaging Proc (3-0-3)
Prerequisite(s): ECE 2025 and [MATH 3770 or ISYE 3770 or CEE 3770 or BMED 2400]
A study of mathematical methods used in medical image acquisition and processing. Concepts, algorithms, and methods associated with acquisition, processing, and display of two- and three-dimensional medical imaged are studied.


Prepared by: May Wang

Topics Covered:
1. Linear 2-D Transforms
2. Image Formation and Representation
3. Image Enhancement and Restoration
4. Image Analysis
5. Image Compression
6. Reconstruction from Projections

Course outcomes:
Students who complete this course will:
Outcome 1: Know the basics of methods common to medical image acquisition and medical image processing (Student Outcome e)
Outcome 2: Understand and apply basic image processing techniques - enhancement and restoration (Student Outcomes e and k)
Outcome 3: Understand and apply advanced image processing techniques - segmentation, registration, and motion analysis - to medical problems (Student Outcomes e and k)
Correlation between course outcomes and student outcomes:

<table>
<thead>
<tr>
<th>BMED 4783</th>
<th>Biomedical Engineering Student Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course outcomes</td>
<td>a</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>X</td>
</tr>
</tbody>
</table>

The Wallace H. Coulter Department of Biomedical Engineering Student Outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering;
b. an ability to design and conduct experiments, as well as to analyze and interpret data;
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, societal, political, ethical, health and safety, manufacturability, and sustainability;
d. an ability to function on multidisciplinary teams;
e. an ability to identify, formulate, and solve engineering problems;
f. an understanding of professional and ethical responsibility;
g. an ability to communicate effectively;
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
i. a recognition of the need for, and an ability to engage in lifelong learning;
j. a knowledge of contemporary issues;
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;