INTRODUCTION TO MEDICAL IMAGE PROCESSING

Class time: TR 12:05-1:25pm

Lecture room: Klaus 1443

Instructor: Dr. Oskar Skrinjar

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Office hours: By appointment

Prerequisites: ECE 2025 and (MATH 3720 or ISYE 3770)

Credits: 3 Hours

Objectives: To study mathematical methods used in medical image acquisition and processing of two- and three-dimensional medical images. Examined in detail will be concepts, algorithms, and methods associated with medical image processing, including representation, enhancement, restoration, analysis, and interpretation of images.

Learning objectives:

By the end of the course students should be able to do the following:

1. Know the basics of methods common to medical image acquisition and medical image processing
   1.1 Distinguish continuous from discrete images
   1.2 Distinguish linear from nonlinear image operators
   1.3 Understand and apply discrete and continuous two- and higher-dimensional Fourier transform
   1.4 Understand image formation and representation

2. Understand and apply basic image processing techniques (enhancement and restoration)
   2.1 Understand the mathematics behind these techniques
   2.2 Implement these techniques in Matlab

3. Understand and apply advanced image processing techniques (segmentation, registration, and motion analysis) to medical problems
   3.1 Understand the mathematics behind these techniques
   3.2 Use basic image processing techniques to improve the performance of advanced ones
   3.3 Implement these techniques in Matlab and apply them to real-life medical problems

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Midterm</td>
<td>30%</td>
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<tr>
<td>Matlab problem</td>
<td>30%</td>
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<tr>
<td>Final Exam (11:30am - 2:20pm on 12/10/09)</td>
<td>40%</td>
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<td>Total</td>
<td>100%</td>
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The exams are cumulative. Test/exam grades become final one week after they are returned in class. Matlab problem is a take-home problem and students should NOT work together on it.

Tentative grading scale:

- A (cs >= 90)
- B (80 <= cs < 90)
- C (70 <= cs < 80)
- D (60 <= cs < 70)
- F (cs < 60)

where cs is the combined score [%].

Exams: The exams (midterm and final exam) will be open book/notes in-class exams. **In NO CASE will a make-up exam be given unless the student obtained approval from the instructor PRIOR to the exam.**

Late Policy: No late Matlab problem will be accepted for grading.

Homeworks: A number of homeworks with theoretical and Matlab questions will be handed out throughout the semester. The homeworks will not be graded. Solutions will be provided and students are encouraged to contact the instructor in case they encounter difficulties in solving homework problems or understanding solutions.

T-Square: T-Square will be utilized in this course (the course website via: http://t-square.gatech.edu). This site contains a number of useful resources, including lecture notes, practice problems with solutions, and old exams.

Honesty: In fairness to the honest majority, ALL incidents of academic misconduct will be reported to the Office of the Dean of Students. You are expected to report to the instructor all incidents of academic misconduct you observe in this class. Visit the Georgia Tech Academic Honor Code home page at http://www.honor.gatech.edu.

Assistance: Any student who feels that she/he may need a classroom or testing accommodation for any sort of disability is encouraged to make an appointment with the instructor.

Attendance: You are responsible for all topics, discussions, handouts, and announcements made in class.

Disclaimer: Errors in any edition/version of the textbook, posted homeworks and their solutions, posted old exams and their solutions or any other material that is allowed on exams cannot be used as an excuse to obtain credit on exams. The fact that different editions/versions of the textbook do not cover identical material cannot be used as an excuse to obtain credit on exams.