

Course Syllabus

BMEN 4370 Introduction to Biomedical Image Processing and Analysis

Fall 2019

Credits 3

Tuesdays and Thursdays, 8:30 to 9:45 AM, Room: ML1 1.106

Professor Contact Information

Baowei Fei, PhD, EngD, FAIMBE, FSPIE
Cecil H. and Ida Green Chair in Systems Biology Science
Professor, Department of Bioengineering
Erik Jonsson School of Engineering and Computer Science
Office: BSB 12.302
Phone: 972-883-7239
Email: bfei@utdallas.edu
Office hours: See eLearning for up to date times and locations and by appointment (email the instructor for a time)

Teaching Assistant

Haowei Tai
Email: haowei.tai@utdallas.edu
TA Office Hours and Location: Mondays 11:00 AM – 12:00 Noon at ML1 1.106

Course Pre-requisites, Co-requisites, and/or Other Restrictions

EE3302 or BMEN 3402 and experience with MATLAB programming

Course Description

This course covers basic principles of digital image processing and analysis with an emphasis on biomedical and clinical applications. Topics include an introduction to different imaging modalities (MRI, CT, ultrasound, and optical imaging), digital image operations, image intensity transformations, filtering in spatial and frequency domains, image restoration and enhancement, color image processing, an introduction to image segmentation, and image visualization. This course provides laboratory exercises and require students to use MATLAB for biomedical image processing and analysis in the computer lab.

Student Learning Objectives/Outcomes

Biomedical Engineering Bachelor's graduates are expected to attain the following Program Educational Objectives (PEOs) within a few years after graduation:

1. Careers that lead to leadership roles in biomedical engineering or relative fields **OR**
2. Gain admission to graduate, professional, or health related programs

Course Learning Objective / Student Outcomes:

Student outcomes followed by ABET classification include:

Course Learning Objective (CLO)	Student Outcome (SO)
Utilize image processing techniques to fundamentally enhance the quality of a medical image.	(SO1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
Develop software for image manipulation using MATLAB	(SO2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health and economic factors.
Demonstrate knowledge of image processing fundamentals and algorithms.	(SO1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Required Textbooks and Materials

- Digital Image Processing (4th Edition) by Rafael Gonzalez and Richard Woods (ISBN-13: 978-0-13-335672-4)
- Access to MATLAB (Available in Computer Lab ML1 1.106)

Suggested Course Materials

- Digital Image Processing Using MATLAB (2nd Edition) by Rafael Gonzalez, Richard Woods, Steven Eddins

Assignments & Academic Calendar

The course will have lectures or laboratory exercises on Tuesday and Thursday as well as in-class quizzes, homework assignments, midterm and final exams. The academic calendar and course schedule are posted on eLearning. The schedule is subject to change. The final exam date will be scheduled by the university sometime mid semester. Check online to find the date and time of the final exam.

Important Dates:

Last day to drop a class without a “W”
Withdrawal Ends

Wednesday, September 4
Thursday, October 24

Grading Policy

The evaluation of all student work is the instructor’s professional development and not subject to negotiation. The grades for this class will consist of:

- Participation 5%
- In-Class Quiz 5%
- Homework Assignments 10%
- Laboratory Exercises 40%
- Midterm Examination 20%
- Final Examination 20%

Grade	Points	Grade	Points	Grade	Points	Grade	Points
A+	97-100	B+	87-89.9	C+	77-79.9	D+	67-69.9
A	93-96.9	B	83-86.9	C	73-76.9	D	63-66.9
A-	90-92.9	B-	80-82.9	C-	70-72.9	D-	60-62.9
						F	<60

Grading Errors: If you think the instructor has made an error in grading, turn in the original assignment **within one week of getting it back**. No grade changes will be considered after the one week deadline has passed. Keep in mind that the entire assignment is subject to regrading when it is submitted.

Privacy: UTD takes students' privacy very seriously. The instructor is unable to email students the grade or even discuss grades by email. Grades will be posted on eLearning and all questions regarding grades should be handled in office hours.

Course Policies

Late work and Make-up exams: Late work will not be accepted without the prior consent of the instructor, with the exception of unusual, documented, circumstances. In such circumstances, late work and make up exams will be dealt with on a case by case basis and the instructor's decision will be final. Missed quizzes, exams without notice will receive a zero. Missed quizzes exams with advanced notification of absence for documented and permissible reasons (*e.g.*, illness) can be replaced by a make-up exam. If you have a university related conflict, you may arrange to take the test early. Good communication between the students and instructor will prevent situations where late work is not accepted.

Class Attendance and Citizenship: Attendance is mandatory and can factor into the students grade. Use of cellular phones during the class as well as arriving to class late will result in being marked absent. To be present, the student must be both physically and mentally present.

Academic Integrity: Copying other's assignments or copying from the solution manual will result in a zero on the assignment and potential academic and program consequences. No collaboration during tests/exams/quizzes is tolerated. If you are caught cheating on an exam, a grade of zero will be assigned and the student will be referred to the Dean of Students. Assignments that permit collaboration will be clearly designated.

All homework, quizzes, exams and extra credit are to be individual efforts unless noted otherwise. Copying of homework, extra credit, quizzes, or exams, in whole or in part, from other students or from assignments of previous semesters will be considered to be an act of academic dishonesty.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to <http://go.utdallas.edu/syllabus-policies> for a full explanation of these policies.

Students with Disabilities

It is the policy and practice of The University of Texas at Dallas to make reasonable disability-related accommodations and/or services for students with documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required (see <http://www.utdallas.edu/studentaccess>). If you are eligible to receive disability-related accommodations and/or services and to ensure accommodations will be in place when the academic semester begins, students are encouraged to submit documentation four to six weeks in advance. Students who have questions about receiving accommodations, or those

who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact the Office of Student AccessAbility for a confidential discussion.

The Office of Student AccessAbility provides:

1. Academic accommodations for eligible students with a documented permanent physical, mental or sensory disability
 2. Facilitation of non-academic and environmental accommodations and services
 3. Resources and referral information, and advocacy support as necessary and appropriate.
- OSA is located in the Student Services Building, suite 3.200. They can be reached by phone at 972-883-2098, or by email at studentaccess@utdallas.edu.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.