FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Graduate Programs

Department EECS

College ENG&CS

*(To obtain a course number, contact **erudolph@fau.edu**)*

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner _____
Catalog _____

Prefix BME
Number 5538

(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)
Lab Code

Type of Course Lecture

Course Title Bioimaging

Credits *(Review Provost Memorandum)* 3

Effective Date *(TERM & YEAR)* Spring 2023

Grading *(Select One Option)*
Regular (X)
Sat/UnSat ( )

Course Description *(Syllabus must be attached; see Guidelines)*
Provides students of engineering and science with an introduction to the physical and signal processing bases of modern medical imaging systems.

Prerequisites
None

Prerequisites, Corequisites and Registration Controls are enforced for all sections of course.

Academic Service Learning (ASL) course ☐
Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Corequisites
None

Registration Controls *(For example, Major, College, Level)*
Eng or CS Graduate Standing or approval by instructor

Minimum qualifications needed to teach course:
Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)

List textbook information in syllabus or here
See attached syllabus

Faculty Contact/Email/Phone
mranji@fau.edu

List/Attach comments from departments affected by new course

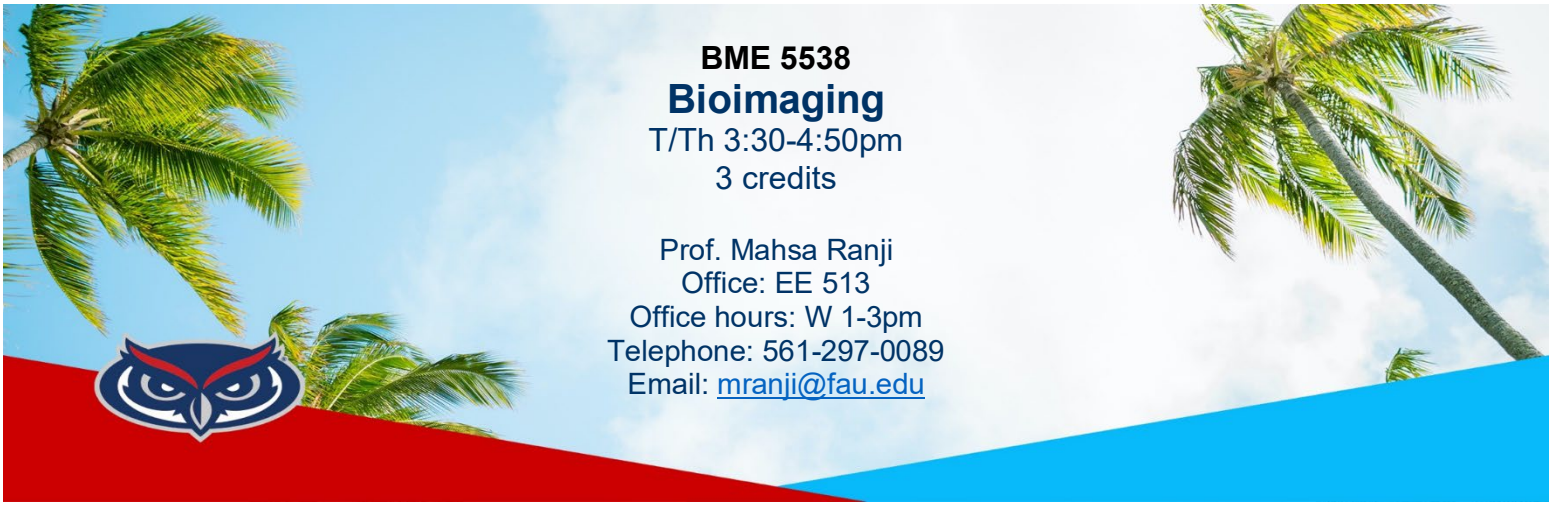
Approved by	***Date***
Department Chair	8/24/2022
College Curriculum Chair	9/19/2022
College Dean	9/19/2022
UGPC Chair	Oct 13, 2022
UGC Chair	Oct 13, 2022
Graduate College Dean	Oct 17, 2022
UFS President	
Provost	

Digitally signed by Mihaela Cardei
DN: cn=Mihaela Cardei, o=Florida Atlantic University, ou, email=mcardei@fau.edu, c=US
Date: 2022.09.19 15:00:56 -04'00'

Mihaela Cardei (Oct 13, 2022 10:50 EDT)

Mihaela Cardei (Oct 13, 2022 10:50 EDT)

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.



Office	EE 513
Office hours	W, 1-3pm
Telephone	561-297-0089
Email	mranji@fau.edu

Course Description

Provides students of engineering and science with an introduction to the physical and signal processing bases of modern medical imaging systems.

Instructional Method

A brief statement about the Instructional Method and the expectations for student attendance in the class will be included here. For a list of the Instructional Methods and their definitions, see https://www.fau.edu/registrar/courses/Instru_Method.php

Prerequisites/Corequisites

None.

Course Objectives/Student Learning Outcomes

The course will provide students with the necessary fundamental concepts of biomedical imaging. Topics of the course will cover, image characteristics, Fourier transforms, image acquisition and processing e.g. convolution, sampling, resolution, contrast, filtering; tissue optics, x-ray; CT; ultrasound; and MRI.

Course Grading Scale

Homework:	30%
Exam1:	35%
Exam2:	35%

Exams 1 and 2 are noncumulative an open book.

Homework

10 homework will be assigned and each counts for 3% of total grade. Due one week after assignment in class. Late homework is not accepted unless there is a justifiable reason for late submission.

Course Grading Scale

90 and above: “A”, 87-89: “A-“, 83-86: “B+”, 80-82: “B”, 77-79 : “B-“, 73-76: “C+”, 70-72: “C”, 67-69: “C-“,63-66: “D+”, 60-62: “D”, 51-59: “D-“, 50 and below: “F.”

Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

Homework due one week after assignment in class. Late homework is accepted after one day with 50% penalty and not accepted after that unless there is a justifiable reason for late submission.

Classroom Etiquette Policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

Policy on the Recording of Lectures

Because of a new Florida Statute in 2021, the following model language is suggested for inclusion in course syllabi, at the discretion of individual faculty:
Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty

member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Required Texts/Readings

Medical Imaging Signals and Systems, 2nd edition by Jerry L. Prince and Johnathan M. Links, Prentice Hall, 2015. (required)

Supplementary/Recommended Readings (if applicable)

Introduction to Biomedical Imaging, Andrew Webb, Wiley Inter-Science 2003. (recommended)

Course Topical Outline

Week - 1 Introduction to imaging, Image characteristics

Week - 2 Image Characteristics (contrast, resolution, accuracy), HW1

Week - 3 Fourier Transforms in Spatial Domain review, X-ray instrument, HW 2

Week - 4 Projection Radiation (x ray production and imaging), HW 3

Week - 5 Computed Tomography (Instrument and different generations), HW4

Week - 6 Computed Tomography (Radon Transform and reconstruction), HW5

Week - 7 Review, exam 1 (open book/notes)

Week - 8 Ultrasound (sound wave propagation, Reflection/Transmission)

Week - 9 Ultrasound (Imaging modes, Doppler effect), HW6

Week - 10 Ultrasound (Instrument, Transducer), HW7

Week - 11 MRI (physics of magnetic resonance, magnetization, relaxation), HW8

Week - 12 MRI (Spin echoes, T1/T2 contrast mechanisms), HW9

Week - 13 MRI (Instrumentation, Image reconstruction), HW10

Week - 14 MRI, Review