Medical Physics 4D03

IMAGING IN MEDICINE AND BIOLOGY

2016

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Office hours: Wednesday: 1:30 – 2:30 pm
or by appointment

Teaching Assistant:

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September

Classes: Tuesday and Wednesday 12:30 – 1:20 pm ABB 162

Computer Tutorial:
Thursday: 2:30-4:20 KTH B121

Information about the course, including lecture notes, will be available on McMaster’s Avenue to Learn System. The course will appear as MEDPHYS 4D03: IMAGING IN MEDICINE&BIOLOGY under the “My Courses” section.

Objective:

In this course, students will learn principles and practices to become adept in creating, processing, analyzing, and storing digital images for medical and biological research. Formal lectures will explore the math and physics underlying common imaging techniques such as X-Ray imaging, computed tomography (CT), confocal and deconvolution microscopy, and magnetic resonance imaging (MRI). A weekly tutorial in a computer lab will ensure students become fluent in practical image processing.
Course Summary:

The formal lecture portion will cover topics including theoretical images as 2D and 3D continuous functions, the Fourier transform, convolution, 2D and 3D image reconstructions, and digital imaging (resolution, sampling, quantization, contrast, noise, and filtering).

The computer-lab tutorials will teach students image processing using the Matlab programming language via a variety of hands-on exercises.

Evaluation:

Students are required to complete five take-home written assignments in the course. There will be two programming tests administered during the tutorial. There will be an in-class mid-term written test and also a written exam during the final exam period.

The marks will be distributed as follows:

Assignments 20%
In-class Programming Tests 20%
Mid-Term Test 20%
Final Exam 40%

Late assignments will not be marked. Students unable to write a term test or exam for medical reasons will be required to write an alternate examination within one week following the test to receive credit. Standard conversion from mark as a percentage to letter grade will be used.

Laboratory: Students are asked to please bring a USB thumb drive to the weekly lecture in the computer lab. Materials for the lab will be available on Avenue to Learn the day before.

Textbook and Class Materials: There is no required textbook for this class. Students will only be tested on material found in the lecture notes and assignments.

Students may wish to refer to any number of textbooks or websites on medical or digital imaging. One recommended example text is:

Medical Imaging Signals and Systems by Jerry L. Prince and Jonathan M. Links (Prentice Hall; 1 edition (April 25 2005))

Academic Integrity:

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g.
the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:

1) Plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.

2) Improper collaboration in group work.

3) Copying or using unauthorized aids in tests and examinations.

Accommodations for disabled students:

Students with disabilities are encouraged to approach the Centre for Student Development for special accommodations to facilitate learning: http://csd.mcmaster.ca/sswd