INTRODUCTION
BME595 Medical Imaging will review the principle of operation, and applications for several major imaging modalities used in today’s biomedical imaging practice in research labs and in clinical settings. The class includes a weekly 2 hour class, weekly 1 hour tutorial and 4 lab sessions during the semester. The main topics to be covered are Computed tomography (CT), Ultrasound (US), Magnetic resonance (MR) and Optical imaging.

Learning outcomes:
(1) Understanding and explaining the principles of operation and image creation methods in various biomedical imaging techniques.
(2) Computing parameters for each imaging modality such as resolution, signal to noise ratio.
(3) Collecting and analyzing images in Ultrasound and Optical imaging labs.
(4) Evaluating data sets from a clinical CT and MRI scanners, evaluating image properties and analyzing the images in CT and MR imaging labs.
(5) Discussing how a specific imaging modality can relate to an imaging scenario in the body.

COURSE SCHEDULE
Tuesday, 15:00 -17:00, BA 2135 class
Wednesday, 11:00 - 12:00, BA B024 tutorial
Thursday, 09:00 - 12:00, IBBME teaching lab, MB325, Mining: CT, MR, Optical labs, Sick Kids (location to be announced): Ultrasound lab

INSTRUCTORS/LECTURES

<table>
<thead>
<tr>
<th>First</th>
<th>Last Name</th>
<th>Role</th>
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<tr>
<td>Ofer</td>
<td>Levi</td>
<td>Coordinator</td>
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<tr>
<td>James</td>
<td>Mainprize</td>
<td>Instructor- CT</td>
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<tr>
<td>Adam</td>
<td>Waspe</td>
<td>Instructor- US</td>
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<tr>
<td>Marshall</td>
<td>Sussman</td>
<td>Instructor- MRI</td>
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<td>Hai-Ling Margaret</td>
<td>Cheng</td>
<td>MRI co-instructor</td>
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<td>Farrokh</td>
<td>Mansouri</td>
<td>Tutorials TA</td>
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<tr>
<td>Amir</td>
<td>Manbachi</td>
<td>Tutorials TA</td>
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<tr>
<td>Mosa</td>
<td>Alhamami</td>
<td>Lab TA</td>
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<td>Julie</td>
<td>Winterburn</td>
<td>Lab TA</td>
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COURSE TEXT

Biomedical Optical Imaging, by James G. Fujimoto and Daniel L. Farkas, Oxford Univ. Press (2009)
Web resources : Nikon Microscopy center: http://www.microscopyu.com/
Olympus Microscopy center: http://www.olympusmicro.com/
Molecular Expressions imaging center: micro.magnet.fsu.edu

Additional background material: Class notes and referenced articles posted on Blackboard, by the class instructors
COURSE REQUIREMENTS/EVALUATION
Mid-term Exam 25% (Exam type C; no make-up mid-term exam)  
Labs (4) 25% (CT, MR, US, Optical imaging)  
Final Examination 50% (Exam type C)

Exam Type C: Closed book examination. Students may bring a single aid sheet on a standard form supplied by the examiner (obtained from the Office of the Registrar).

Calculators Type 2: non-programmable calculators

* students anticipating a need for additional assistance from the course instructors and TA’s, requiring accommodations in the labs or planning to take exams at the Exam Services center, are requested to contact Dr. Levi to discuss their needs.

TUTORIALS
Tutorial attendance is essential for success in this course. Tutorials are held weekly

LABS
The class will be divided to two lab sections for the CT, MR and optical imaging. These lab modules will be held at the IBBME teaching labs at the Mining building. The Ultrasound lab will be held at the Sick Kids hospital. MR and CT labs involve analysis of raw image data. Optical imaging lab involve operation and evaluation of fluorescence microscopy. Ultrasound lab involves operation and evaluation of an ultrasound imaging system. Every lab party of 2 students will prepare a report for marking. The lab schedule below was based on the initial course enrollment and may change as term progresses. The student assignment for the Ultrasound lab at Sick Kids will be somewhat different, due to space limitations in this lab.

* During the semester, additional (optional) advanced labs may be offered, to enhance student experience.

* Before starting a lab, the students are required to demonstrate sufficient background in the lab content. Class notes, lab protocol and class textbooks are included in the lab preparation resources

LECTURE, TUTORIAL/QUIZZES, LABS, AND EXAM SCHEDULE

Tentative dates:
- Thursday, January 8, 9:00 AM, and 10:30 AM – STTARR imaging facility visit (MARS building)
- Three weeks for each imaging modality classes, tutorials and labs: Optics, CT, MRI, Ultrasound
- Thursday, February 26, 9 AM midterm exam (during lab hours, BA 2185)
- Tuesday, April 7, 3 – 5 PM, class review session