Objectives:
Portable and programmable imaging systems that can be run at user’s desktop form an important bridge between theoretical knowledge gained from imaging physics courses to real-world applications involving clinical imaging systems. The primary learning outcome of this course is to provide students with practical, hands-on experience in computed tomography, magnetic resonance imaging and ultrasound using desktop imaging systems. Students will gain valuable experience in the practical aspects of operation, image acquisition and data analysis during the completion of incrementally challenging and interesting in-class laboratory assignments.

Towards the end of the course, students will also have the opportunity to visit the CT and MRI suites at St. Joseph's Hospital and Lawson Health Research Institute to further understand how the knowledge learnt in this course can be applied to the operation of clinical imaging systems.

Hours: Thursdays 2:30 to 5:30 pm, 3 hours/week, 0.5 course

Place: Medical Biophysics conference room (MSB 493)

Prerequisite:
MBP4475A / MBP9515A / BME9513A (Introduction to Medical Imaging) is recommended but not a requirement.

CAMPEP Elective:
This course is one of the electives available in the Imaging Sciences specialty for the CAMPEP accredited graduate program with a 0.5 course weight.

Topics:
1. The DeskCAT system (http://modusmed.com/education) will be used to illustrate some of the fundamental concepts in X-ray computed tomography. For example: signal linearity, spatial resolution, contrast-to-noise ratio, dual-energy imaging, etc.

2. The Terra Nova system (http://www.magritek.com/products-terranova-overview) will be used to illustrate some of the fundamental concepts in magnetic resonance imaging. For example: homogeneity of magnetic field, shimming, spin-echo sequence, magnetic relaxation parameters (e.g. T1, T2), etc.

3. The Sonosite system (https://www.sonosite.com/ca) will be used to illustrate some of the fundamental concepts in ultrasound imaging. For example: amplitude (A) and brightness (B) scan modes, time gain compensation, image artifacts in ultrasound (e.g. reverberation, speed displacement, refraction), etc.

Course Materials:
No required textbook. Recommended reference articles will be posted to the course OWL site.
Laboratory Assignments:
The course will include up to 12 in-class laboratory assignments corresponding to computed
tomography, magnetic resonance imaging, and ultrasound. On average, there will be 90 to 120 minutes
of in-class access to the imaging equipment for each laboratory assignment. For each laboratory
assignment, the deliverables will consist of a short written report and electronic files(s) containing
outputs as specified by the laboratory assignment (as applicable). Some laboratory assignments may
involve the writing of Matlab scripts to perform basic image/signal processing. The enrolled students will
be divided into 2-3 groups. Each group will focus on one imaging system (modality) for 3-4 weeks and
rotate to another system for the next 3-4 weeks and so on. Written report must be submitted within one
week after completing the in-class assignment. One-week extension may be granted for special
situations but the extension request should be put forth in advance.

Exam:
No exam. The grade evaluation will be based on the laboratory assignments (see above).

Attendance Policy:
All laboratory sessions are mandatory. Any student who, in the opinion of the course co-ordinator is
absent too frequently, will receive a failing grade after due warning has been given in writing from the
course co-ordinator and Graduate Chair.

Cheating and Plagiarism Policy:
Students are encouraged to work together, but each student must take total responsibility for his/her
submitted work. Students must write their reports in their own words. Whenever students take an idea,
or a passage from another author, they must acknowledge their debt both by using quotation marks
where appropriate and by proper referencing such as footnotes or citations. University policy states that
cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is
attended by academic penalties which might include expulsion from the program. If a student is caught
cheating, there will be no second warning.

All written reports may be subject to submission for textual similarity review to commercial plagiarism
detection software under license to the University for the detection of plagiarism. All reports will be
included as source documents on the reference database for the purpose of detecting plagiarism of
papers subsequently submitted to the system. Use of the service is subject to the licensing agreement,
currently between the University of Western Ontario and Turnitin.com (http://www.turnitin.com).

See the School of Graduate and Postdoctoral Studies Scholastic Offence Policy:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf

OWL Internet/Bulletin Board Policy:
It is the student’s responsibility to read the course website posted on Western’s on-line learning
management system, OWL (https://owl.uwo.ca/portal). This includes the course bulletin board and all
information and/or assignments posted about the course. If the student fails to act on information that
has been posted on the course site and does so without a legitimate explanation (i.e., those covered
under the illness/compassionate form), then there are NO grounds for an appeal.

Request for Assignments Extensions
Students are advised to inform the course co-ordinator as soon as possible regarding an extension for
assignment submissions due to medical reasons or other compassionate reasons. Extensions will only
be granted by the course co-ordinators at their discretion.

**Absence Due to Medical Illness**  
Students must familiarize themselves with the Policy on Accommodation for Medical Illness:  
https://studentservices.uwo.ca/secure/index.cfm

If you are unable to meet a course requirement due to illness or other serious or compassionate circumstances, you must provide valid medical or other supporting documentation to the course co-ordinator immediately. It is the student's responsibility to make alternative arrangements with the co-ordinator to complete missing course requirements.

A student requiring academic accommodation due to illness, should use the Student Medical Certificate:  
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf when visiting an off-campus medical facility or request a Record's Release Form for visits to Student Health Services. The form is available at:  
http://www.health.uwo.ca/services/students/policies.html. The release form will allow the course co-ordinator to confirm with Student Health Services that a student's absence from regular attendance or inability to meet scheduled course commitments is due to medical reasons. The nature of the illness will not be divulged by Student Health Services.

**Graduate Students’ Mental Health and Physical Wellness**  
As part of a successful graduate student experience at Western, students are encouraged to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your graduate degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western’s Campus Recreation Centre:  
http://www.uwo.ca/campus_life/athletics.html

All facets of extracurricular campus life in which graduate students can participate are available on this URL:  
http://www.uwo.ca/campus_life/arts_culture.html

Information regarding health and wellness-related services available to students may be found at  
http://www.health.uwo.ca. Students seeking help regarding mental health concerns are advised to speak to someone in whom they feel comfortable confiding, such as their graduate supervisor, their program director (Graduate Chair), or other relevant administrators in their unit. Campus mental health resources may be found at:  
http://www.health.uwo.ca/mental_health/resources.html

**Accessibility to the Course and Course Materials**  
Please contact the course coordinator if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at (519) 661-2111 x 82147 for any specific question regarding an accommodation.

**Course coordinator:** Dr. Aaron So

**Email:** aso@robarts.ca

**Phone:** (519) 931-5777 x 24224

**Office:** Room 1200B, Robarts Research Institute

**Consultation Hours:** By appointment