University of Victoria Engineering

Faculty of Engineering

COURSE OUTLINE

ELEC 435 – Medical Image Processing

Term – SUMMER 2015 (201505)

Instructor

Dr. Alexandra Branzan Albu
Phone: 250-721-8681
E-mail: aalbu@uvic.ca

Office Hours

By appointment only
Location: ECS 324

Course Objectives

The objective of this course is to provide students with the basic skills needed to analyze, formalize, and solve diverse medical imaging problems from an image processing viewpoint.

Learning Outcomes

By the end of the course, students will be able to:

- lead an in-depth discussion (from an image processing viewpoint) on medical conditions that are diagnosed and tracked using medical imaging techniques.
- summarize the image formation processes of X-Ray, MRI, CT, ultrasound, and the challenges that each image type imposes on medical image processing algorithms
- design and implement basic algorithms for noise reduction, contrast enhancement, image segmentation, and object recognition in the context of medical images.
- design, implement and evaluate a multi-step medical image processing approach

Syllabus

PART 1. IMAGE FORMATION

- Imaging systems
- Medical images obtained with ionizing radiation
- Medical images obtained with non-ionizing radiation
- Multi-modality imaging

PART 2. IMAGE PROCESSING

- Noise reduction algorithms in medical images
- Contrast enhancement algorithms in medical images
- Edge detection
- Medical Image Segmentation
- Feature extraction, object recognition and classification
- Performance evaluation of image processing algorithms

A-Section(s): A01 / CRN 30333, A02/30334
Days: Tuesday, Wednesday, Friday
Time: 9:30-10:20 am
Location: ECS 130

Required Text

Title: Guide To Medical Image Analysis: Methods and Algorithms
Author: Klaus D. Toennies
Publisher: Springer
Year: 2012
References: Scientific articles will be posted on Course Space as mandatory readings.

Assessment:

Assignments (5)	25%	Due Dates: to be posted on Course Spaces
Mid-terms	40%	Tentative dates: Midterm 1-June 16 AND 17; Midterm 2-July 22 AND 23
Project	30%	
Class participation	5%	

Note: Failure to pass the combined mark of the midterms will result in a failing grade for the course. Make-up midterms will not be available.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

There will be no supplemental examination for this course.

http://web.uvic.ca/calendar/FACS/UnIn/UARe/Grad.html

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Accommodation of Religious Observance
http://web.uvic.ca/calendar/GI/GUPo.html

Policy on Inclusivity and Diversity
http://web.uvic.ca/calendar/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour in current Undergraduate Calendar, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult entry in current Undergraduate Calendar for the UVic policy on academic integrity.

http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf

Course Lecture Notes

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.