UVic Department of Electrical and Computer Engineering

COURSE OUTLINE
ELEC 435 – Medical Image Processing
Summer 2013

Instructor: **Office Hours:**

    Dr. Alexandra Branzan Albu   by appointment only
    Phone: 250-721-8681
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Lectures: **Labs: N/A   Location: N/A**

    A-Section(s): A01 / CRN 30290, A02 / CRN 30289
    Days: Tuesday, Wednesday, Friday
    Time: 9:30-10:20 am
    Location: ECS 130

Required Text:

    Title: Digital Image Processing for Medical Applications
    Author: Geoff Dougherty
    Publisher: Cambridge University Press
    Year: 2009

References:

To be posted on Moodle site.

Assessment:

Assignments (8):	25%	
Project	40%	
Mid-terms (2)	30% (15% each)	Tentative dates: June 21, July 30.
Class participation	5%	

Note: Students must pass the combined mark of the midterms in order to pass the course.

Due dates for assignments:

All assignments are due one week after assignment is handed out. Late assignments will not be accepted.

The final grade obtained from the above marking scheme will be based on the following percentage-to-grade point conversion:

Passing Grades	Grade Point Value	Percentage For Instructor Use Only	
A+	9	90 - 100	
A	8	85 - 89	
A-	7	80 - 84	
B+	6	77 - 79	
B	5	73 - 76	
B-	4	70 - 72	
C+	3	65 - 69	
C	2	60 - 64	
D	1	50 - 59	
Failing Grades	Grade Point Value	Percentage For Instructor Use Only	Notes
E	0	35 - 49	Fail, conditional supplemental exam.
F	0	0 - 34	Fail, no supplemental exam.
N	0	0 - 49	Did not write examination, Lab or otherwise complete course requirements by the end of the term or session; no supplemental exam.

*   The rules for supplemental examinations are found on pages 79-80 of the current 2011/12 Undergraduate Calendar.

Term in which E Grade was obtained:	Application Deadline for Supplemental Exam	Supplemental Exam Date
First term of Winter Session (Sept – Dec)	Following February 28	First week of following May
Second term of Winter Session (Jan – Apr)	Following June 30	First week of following September
Summer Session (May – Aug)	Following October 31	First week of following January

Deferred exams will normally be written at the start of the student's next academic term; i.e., approximately 4 months following the deferral of the exam.

Course Description

1. 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.

2. 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 in the context of their project

3. 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

Guidelines on Religious Observances

1. Where classes or examinations are scheduled on the holy days of a religion, students may notify their instructors, at least two weeks in advance, of their intention to observe the holy day(s) by absenting themselves from classes or examinations.
2. Instructors will provide reasonable opportunities for such students to make up work or missed examinations.
3. Students will cooperate by accepting the provision of reasonable opportunities for making up work or missed examinations.
4. The University Secretary's Office will distribute a multi-faith calendar to each academic unit annually.

Commitment to Inclusivity and Diversity

The University of Victoria is committed to promoting, providing and protecting a positive, supportive and safe learning and working environment for all its members.

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.engr.uvic.ca/policy/professional-behaviour.php 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

http://web.uvic.ca/calendar2010/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.