UVic Department of Electrical and Computer Engineering

COURSE OUTLINE
BME 403 – Medical Image Processing
Summer 2014

Instructor: **Office Hours:**

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

Lectures: **Labs: N/A   Location: N/A**

    A-Section(s): A01 / CRN 30055
    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 Course Spaces site.

Assessment:

Assignments (6):	25%	
Project	40%	
Mid-terms (2)	30% (15% each)	Tentative dates: June 20, July 25.
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 page 80 of the current 2013/14 Undergraduate Calendar.

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

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 ECE Chair by email or the ECE Chair's secretary to set up an appointment.

Accommodation of Religious Observance
See http://web.uvic.ca/calendar2014/GI/GUPo.html

Policy on Inclusivity and Diversity
See http://web.uvic.ca/calendar2014/GI/GUPo.html

Standards of Professional Behaviour

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour at http://www.uvic.ca/engineering/current/undergrad/index.php#section0-25 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/calendar2014/FACS/UnIn/UARe/PoAcI.html for the UVic policy on academic integrity.

Plagiarism detection software may be used to aid the instructor and/or TA's in the review and grading of some or all of the work you submit.