University of Victoria Engineering

Faculty of Engineering

COURSE OUTLINE

ELEC 459/534 – Applications of Digital Signal Processing Techniques

Term – Spring 2016 (201601)

Instructor

Dr. Wu-Sheng Lu
Phone: 8692
E-mail: wslu@ece.uvic.ca

Office Hours

Days: Wednesdays
Time: 14:40 – 16:40
Location: EOW 427

Course Objectives

To learn the structure, principles, implementation, and applications of digital signal processing systems.

Learning Outcomes

Working knowledge of signal sampling, digital filtering and signal interpolation; working knowledge of FFT, DCT, two-channel based filter banks and adaptive filtering; working knowledge DCT based JPEG, adaptive system identification and channel estimation techniques, and restoration and compression of audio signals and digital images.

Syllabus

Introduction Motivation and structure of DSP systems.	1
Sampling and Aliasing The Shannon Theorem. Anti-aliasing Filtering. Sampling of bandpass signals. Oversampling.	3
Analysis of Discrete Signals *z* transform, Discrete Fourier transform, and Discrete cosine transform	4
Digital Filters and Filter Banks FIR filters. IIR filters. Filter banks. Applications.	8
Signal Interpolation Lagrange polynomial. Upsampling-lowpass-filtering method. FFT-based method.	7
De-Noising and Compression of Digital Signals Subband denoising. Noise removal by subspace methods. Subband coding. Examples and case studies.	5
Adaptive Filtering General structure of adaptive systems. Wiener filters. Steepest descent and LMS algorithms. Applications.	7

A-Section(s): A01/CRN 21158; A02/CRN 21159
Days: Tuesdays, Wednesdays, & Fridays
Time: 11:30 – 12:20
Location: ELL 060

B01 Tue 14:30-17:20 ELW B326 TA:
B03 Thu 14:30-17:20 ELW B326 TA:

Required Text

Title: Lecture Notes for ELEC 459/534

Optional Text

Title:

Author: Wu-Sheng Lu	Author:
Publisher: Course Pack at UVic Bookstore	Publisher:
Year: September 2014	Year:

References:

Assessment:

Assignments:	10 %	
Labs (ELEC 459, do Experiments 2, 3, 5, 6))	15 %	
Labs and Project (ELEC 534, do Experiments 2, 3, 5, 6)	15 %	
Mid-term	20 %	Date: Feb. 17, Wednesday.
Final	55 %	

Note:

Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

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.

Assignment of E grade and supplemental examination for this course will be at the discretion of the Course Instructor. The rules for supplemental examinations can be found in the current Undergraduate Calendar.

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, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

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

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

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

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.