Faculty of Engineering | Electrical and Computer Engineering
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COURSE OUTLINE

ECE 534 Applications of Digital Signal Processing Techniques

Term – SPRING 2021 (202101)

Instructor	**Office Hours**
Dr. Wu-Sheng Lu	No face-to-face office hours.
Phone: 8692	Questions to be addressed by e-mails and recorded lecture videos.
E-mail: wslu@ece.uvic.ca	Course website: https://www.ece.uvic.ca/~wslu/459_534/index.html

Course Objectives

To learn structures, principles, implementations, 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 of DCT-based JPEG; adaptive system identification and channel estimation techniques; and restoration and compression of audio signals and digital images.

Syllabus

Introduction (1)

Motivation and structure of DSP systems.

Analysis of Discrete Signals (7)

1-D and 2-D z transforms. Discrete Fourier transform. Discrete cosine transform. JPEG standard.

Digital Filters (8)

Design of FIR filters. IIR filters. Applications.

Adaptive Filtering (8)

General structure of adaptive systems. Wiener filters. Gradient descent and LMS algorithms. Applications.

Filter Banks (7)

Two-channel filter banks. Down-sampling and up-sampling. Design of filter banks satisfying perfect reconstruction conditions.

De-Noising and Compression of Digital Signals (5)

Subband denoising. Noise removal by subspace methods. Subband coding. Examples and case studies.

A-Section: A01/CRN 20944
Days: Two pre-recorded video lectures, each lasts 75 – 80 minutes, will be posted each week on the course website.
Time: One pre-recorded video lecture will be posted each Tuesday and Friday.
Link: https://www.ece.uvic.ca/~wslu/459_534/index.html

B01/CRN 20945
Dates: Feb. 8, Mar. 1, Mar. 15, Mar. 29.
Time: 4:00pm – 6:50pm
TAs:
Marker: Kareem Moeen, email: kmoeen@uvic.ca
Lab instructor: Lei Zhao, email: leizhao@uvic.ca

Required Textbook

Title: Online lecture notes.
Author: Wu-Sheng Lu
Year: January 2021.

Online Course Delivery:
As this course will be conducted online during this term, students will need to complete assignments online. The students will require access to a computer which has the following software installed: MATLAB.

References: See course notes.

Assessment:

Assignments:	10 %	Due Dates: to be posted.	
Labs & Project	15 %		
Mid-term	20 %	Date: March 2, Tuesday, 11:30 am – 12:20 pm.	
Final Exam	55 %		

Important: All deadlines and schedules for this course will reference Pacific Standard Time until March 14, 2021 and then Pacific Daylight Time.

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 Graduate Calendar.

https://www.uvic.ca/calendar/archives/202101/grad/index.php#/policy/B13jeiMdE?bc=true&bcCurrent=07%20-%20Grading&bcItemType=policies

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.

Course Withdrawal Deadlines:
- January 19, 2021: Withdrawal with 100% reduction of tuition fees (under review)
- February 9, 2021: Withdrawal with 50% reduction of tuition fees (under review)
- February 28, 2021: Last day for withdrawal (no fees returned) (under review)

Accommodation of Religious Observance:
https://www.uvic.ca/calendar/archives/202101/grad/index.php#/policy/SkmigiMOV?bc=true&bcCurrent=17%20-%20Accommodation%20of%20Religious%20Observance&bcItemType=policies

Policy on Inclusivity and Diversity:
Engineering: https://www.uvic.ca/engineering/about/equity/index.php
Academic Calendar:
https://www.uvic.ca/calendar/archives/202101/grad/index.php#/policy/HkQ0pzdAN?bc=true&bcCurrent=%20General%20University%20Policies&bcGroup=General%20University%20Policies&bcItemType=policies

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

Academic Integrity:

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 Graduate Calendar for the UVic policy on academic integrity.

https://www.uvic.ca/calendar/archives/202101/grad/index.https://www.uvic.ca/calendar/archives/202101/grad/index.php#/policy/BJujesM_E?bc=true&bcCurrent=02%20-%20Policy%20on%20Academic%20Integrity&bcItemType=policiesphp#/policy/BJujesM_E?bc=true&bcCurrent=02%20-%20Policy%20on%20Academic%20Integrity&bcItemType=policies

Equality:
This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building: https://www.uvic.ca/services/cal/. The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

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.

Sexualized Violence Prevention and Response at Uvic:
UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support, please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:
> **Where:** Sexualized violence resource office in EQHR; Sedgewick C119
> **Phone:** 250.721.8021
> **Email:** svpcoordinator@uvic.ca
> **Web:** www.uvic.ca/svp

Office of the Ombudsperson:
The Office of the Ombudsperson is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on

an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca, Website: https://uvicombudsperson.ca/