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## ECE 483 – Digital Video Processing Spring 2021 (202101)

(see also: <http://www.ece.uvic.ca/~panagath/ELEC483/ECE483.html> )

### Instructor:

Dr. Pan Agathoklis  
Phone: 721-8618  
E-mail: [panagath@ece.uvic.ca](mailto:panagath@ece.uvic.ca)

### Office Hours:

Days: Mondays & Thursdays  
Time: 1:30pm – 2:30pm  
Location: on line using zoom

Course Objectives: Introduction in the theory and practice of processing video signals  
Understanding the mathematical tools used in the analysis of multidimensional signals  
Understanding video coding and video standards conversion

Syllabus ELEC 483: Representation of digital video. Image formation models. Spatio-temporal sampling and sampling structure conversion. Two- and three-dimensional motion estimation techniques. Optical flow, block-based and pel-recursive methods for motion estimation. Still image and video compression methods and standards. Interframe compression and model-based methods for video compression. Digital video systems and applications.

### Learning Outcomes

- 1 Apply multidimensional Fourier and z Transforms to analyse video signals
- 2 Interpret the multidimensional sampling theorem using lattices
- 3 Interpret video sampling and sampling rate conversion
- 4 Illustrate the video standards conversion
- 5 Use Motion Estimation and Motion Compensation for video frame prediction
- 6 Demonstrate the foundations of hybrid video coding
- 7 Illustrate the principles of video coding standards

### Lectures:

Section(s): A01 (CRN 20928)  
Days: Mondays and Thursdays  
Time: 11:30 am – 12:50 p.m.  
Location: on line using zoom

### Recommended Text:

Title: Video Processing and Communications  
Author: Y. Wang, J. Osterman and Y-Q. Zhang  
Publisher: Prentice-Hall  
Year: 2002

Due dates for assignments: see  
<http://www.ece.uvic.ca/~panagath/ELEC483/ECE483.html>

#### Assessment:

Assignments:	5%	
Project:	15%	Due on the day of final exam
Mid-term	25%	Date: Monday, March 1, 2021
Final	55%	TBA

Note: Failure to complete the project will result in a grade of N being awarded for the course

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

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.

<https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=policies>

**Assignment of an 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.**

[https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/SJ2Rxoz\\_N?bc=true&bcCurrent=13%20-%20Examinations&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=policies](https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/SJ2Rxoz_N?bc=true&bcCurrent=13%20-%20Examinations&bcGroup=Undergraduate%20Academic%20Regulations&bcltemType=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 Assistant to set up an appointment.

#### **Course Withdrawal Deadlines:**

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

#### **Accommodation of Religious Observance:**

<https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/r1q0gofdN?bc=true&bcCurrent=10%20-%20Accommodation%20of%20Religious%20Observance&bcltemType=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/undergrad/index.php#/policy/HkQ0pzdAN?bc=true&bcCurrent=%20General%20University%20Policies&bcGroup=General%20University%20Policies&bcltemType=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.

<https://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 Undergraduate Calendar for the UVic policy on academic integrity.

[https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/Sk\\_0xsM\\_V?bc=true&bcCurren=08%20-%20Policy%20on%20Academic%20Integrity&bcltemType=policies](https://www.uvic.ca/calendar/archives/202101/undergrad/index.php#/policy/Sk_0xsM_V?bc=true&bcCurren=08%20-%20Policy%20on%20Academic%20Integrity&bcltemType=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 an 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, 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](http://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](mailto:svpcoordinator@uvic.ca)

**Web:** [www.uvic.ca/svp](http://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](mailto:ombuddy@uvic.ca), Website: <https://uvicombudsperson.ca/>



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## ECE 583 – Digital Video Processing Spring 2021 (202101)

(see also: <http://www.ece.uvic.ca/~panagath/ELEC483/ECE483.html> )

### Instructor:

Dr. Pan Agathoklis  
Phone: 721-8618  
E-mail: [panagath@ece.uvic.ca](mailto:panagath@ece.uvic.ca)

### Office Hours:

Days: Mondays & Thursdays  
Time: 1:30pm – 2:30pm  
Location: on line using zoom

Course Objectives: Introduction in the theory and practice of processing video signals  
Understanding the mathematical tools used in the analysis of multidimensional signals  
Understanding video coding and video standards conversion

Syllabus ECE 583: Representation of digital video. Image formation models. Spatio-temporal sampling and sampling structure conversion. Two- and three-dimensional motion estimation techniques. Optical flow, block-based and pel-recursive methods for motion estimation. Still image and video compression methods and standards. Interface compression and model-based methods for video compression. Digital video systems and applications. Students are required to complete a project.

### Learning Outcomes

- 1 Apply multidimensional Fourier and z Transforms to analyse video signals
- 2 Interpret the multidimensional sampling theorem using lattices
- 3 Interpret video sampling and sampling rate conversion
- 4 Illustrate the video standards conversion
- 5 Use Motion Estimation and Motion Compensation for video frame prediction
- 6 Demonstrate the foundations of hybrid video coding
- 7 Illustrate the principles of video coding standards

### Lectures:

Section(s): A01 (CRN 20957)  
Days: Mondays and Thursdays  
Time: 11:30 am – 12:50 p.m.  
Location: on line using zoom

### Recommended Text:

Title: Video Processing and Communications  
Author: Y. Wang, J. Osterman and Y-Q. Zhang  
Publisher: Prentice-Hall  
Year: 2002

Due dates for assignments: see  
<http://www.ece.uvic.ca/~panagath/ELEC483/ECE483.html>

#### Assessment:

Assignments:	5%	
Project:	15%	Due on the day of final exam
Mid-term	25%	Date: Monday, March 1, 2021
Final	55%	TBA

Note: Failure to complete the project will result in a grade of N being awarded for the course

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

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

#### Policy on Inclusivity and Diversity:

Engineering: <https://www.uvic.ca/engineering/about/equity/index.php>

Academic Calendar:

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facilitate communication, provide feedback on an appeal, investigate and make recommendations.  
Phone: 250-721-8357; Email: [ombuddy@uvic.ca](mailto:ombuddy@uvic.ca), Website: <https://uvicombudsperson.ca/>