



ECE 573 Advanced Engineering Design By Optimization

Term – Spring 2019 (201901)

Instructor

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Office Hours

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

Course Objectives

To learn fundamental theory, main stream contemporary methods and algorithms of constrained optimization. Applications of these algorithms to real-world problems in engineering and science will be an integral part of the course.

Learning Outcomes

Thorough understanding of the basic concepts and theory of constrained optimization; working knowledge of the methods and algorithms to be covered by the course.

Syllabus

Basic Elements of Unconstrained Optimization – A Review 4

Unconstrained optimization problems. Gradient descent, Newton, and quasi-Newton algorithms.

Theory of Constrained Optimization 7

Lagrange multipliers. First-order necessary conditions. Second-order conditions. Convexity and duality.

Standard Convex Constrained Problems 9

Linear and quadratic programming. Semidefinite programming (SDP). Second-order cone programming (SOCP). Software.

Methods for General Convex Constrained Problems 8

Subgradient and conjugate functions. $L1$ - $L2$ minimization. Alternating direction method of multipliers.

Methods for Nonconvex Constrained Problems 8

Sequential convex programming method. Sequential QP programming. Convex-concave procedure (CCP). Examples and case studies.

A-Section(s): A01 / CRN 20934

Days: Tuesday, Wednesday, and Friday

Time: 1:30 pm – 2:20 pm

Location: Elliott 162

Required Text

Title: Lecture notes to be posted.

Author: Wu-Sheng Lu

Year: January 2019

References: See the course notes.

Assessment:

Assignments:	25 %	Due Dates: to be posted.
Project:	20 %	Due on the same day as the final exam.
Final Exam:	55 %	

Note:

Failure to pass the final exam will result in a failing grade 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://web.uvic.ca/calendar2019-01/grad/academic-regulations/grading.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 Assistant to set up an appointment.

Accommodation of Religious Observance:

<https://web.uvic.ca/calendar2019-01/grad/registration/Registration.1.17.html#>

Policy on Inclusivity and Diversity:

<https://web.uvic.ca/calendar2019-01/general/policies.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 Graduate Calendar for the UVic policy on academic integrity.

<https://web.uvic.ca/calendar2019-01/grad/academic-regulations/academic-integrity.html>

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 Resource Centre for Students with a Disability located in the Campus Services Building.

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