Department of Mathematics & Statistics
Concordia University

> **MATH 479 (MAST 680B/837B & MATH 618B)**
> Convex and Non-Linear Analysis
> ***Fall 2016***

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Office hours: Thursdays, 9:00-10:30 a.m.

References: The course will consist of a selection of topics listed below for which you may consult the following sources:

i.   *Convexity* by Roger Webster, Oxford (1994).
ii. *Convexity* by H. G. Eggleston, Cambridge (2009).
iii. *Selected Topics in Convex Geometry* by Maria Moszynska, Birkhauser (2006). **(Electronic resource of Concordia's library)**
iv. http://www.stanford.edu/~boyd/cvxbook/bv_cvxbook.pdf with errata. http://www.stanford.edu/~boyd/cvxbook/cvxbook_errata.html
v.   *Convex bodies: The Brunn-Minkowski Theory* by Rolf Schneider, Encyclopedia of Mathematics and its Applications (2013).

Topics: Did you hear about the isoperimetric inequality? It is perhaps the most famous geometric inequality already known in Ancient Greece, but proved rigorously only in the 19th century.

Starting with classical inequalities for convex sets and functions, the course aims to present famous geometric inequalities like the Brunn-Minkowski inequality and its related functional form, Prekopa-Leindler, the Blaschke-Santalo inequality, the Urysohn inequality, as well as more modern ones such as the reverse isoperimetric inequality, or the Brascamp-Lieb inequality and its reverse form. In the process, we will touch upon log-convex functions, duality for sets and functions and, generally, extremum problems.

Grading: Homework (20%), Midterm (30%), Final Exam (50%).
Graduate students will be required to do extra work for these evaluations.

The homework will be assigned approximately every two weeks, during class, and posted on Moodle. In case of a student's absence or late arrival, it is the student's responsibility to find the assignment and submit it on time. **No late assignments will be accepted.**

A midterm exam will be scheduled in class during the 7th week of classes. The exact date will be announced at the beginning of the term. **Please be aware that a missed test cannot be made up.**

Have a good term!