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## MATH 378 Nonlinear Optimization (3 credits)

Offered by: Mathematics and Statistics ([Faculty of Science \(/study/2022-2023/faculties/science/\)](#))

### Overview

Mathematics & Statistics (Sci) : Optimization terminology. Convexity. First- and second-order optimality conditions for unconstrained problems. Numerical methods for unconstrained optimization: Gradient methods, Newton-type methods, conjugate gradient methods, trust-region methods. Least squares problems (linear + nonlinear). Optimality conditions for smooth constrained optimization problems (KKT theory). Lagrangian duality. Augmented Lagrangian methods. Active-set method for quadratic programming. SQP methods.

**Terms: This course is not scheduled for the 2022-2023 academic year.**

Instructors: There are no professors associated with this course for the 2022-2023 academic year.

- Prerequisites: [MATH 223 \(/study/2022-2023/courses/math-223\)](#) or [MATH 247 \(/study/2022-2023/courses/math-247\)](#) or [MATH 236 \(/study/2022-2023/courses/math-236\)](#) or [MATH 251 \(/study/2022-2023/courses/math-251\)](#). [MATH 248 \(/study/2022-2023/courses/math-248\)](#) or [MATH 314 \(/study/2022-2023/courses/math-314\)](#) or [MATH 358 \(/study/2022-2023/courses/math-358\)](#). [MATH 243 \(/study/2022-2023/courses/math-243\)](#) or [MATH 255 \(/study/2022-2023/courses/math-255\)](#).
- Not open to students who have taken [MATH 560 \(/study/2022-2023/courses/math-560\)](#).

*This course may be used as a required or complementary course in the following programs:*

[Bachelor of Arts \(B.A.\) - Supplementary Minor Concentration in Mathematics \(/https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-supplementary-minor-concentration-mathematics/\)](#)

[Bachelor of Arts \(B.A.\) - Supplementary Minor Concentration Statistics \(/https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-supplementary-minor-concentration-statistics/\)](#)

[Bachelor of Arts \(B.A.\) - Supplementary Minor Concentration Statistics \(/https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-\)](#)

[ba-supplementary-minor-concentration-statistics](#))

[Bachelor of Engineering \(B.Eng.\) - Minor Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-mathematics\)](#)

[Bachelor of Science \(B.Sc.\) - Honours Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-mathematics\)](#)

[Bachelor of Science \(B.Sc.\) - Honours Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-science-bsc-honours-mathematics\)](#)

[Bachelor of Science \(B.Sc.\) - Liberal Program - Core Science Component Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-mathematics\)](#)

[Bachelor of Science \(B.Sc.\) - Liberal Program - Core Science Component Statistics \(https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-statistics\)](#)

[Bachelor of Science \(B.Sc.\) - Major Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-mathematics\)](#)


[Bachelor of Science \(B.Sc.\) - Major Statistics \(https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-statistics\)](#)

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