

**Dynamic Schedule:** Visit [Minerva Class Schedule](#)[https://horizon.mcgill.ca/pban1/bwckschd.p\\_disp\\_dyn\\_sched](https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched) for course dates & times.McGill.ca (<https://www.mcgill.ca>) / Overview (/study/2022-2023/) / All Courses (/study/2022-2023/courses/search)

# MATH 223 Linear Algebra (3 credits)

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

## Overview

Mathematics & Statistics (Sci) : Review of matrix algebra, determinants and systems of linear equations. Vector spaces, linear operators and their matrix representations, orthogonality. Eigenvalues and eigenvectors, diagonalization of Hermitian matrices. Applications.

**Terms: Fall 2022, Winter 2023**

Instructors: Macdonald, Jeremy; Pichot, Michael (Fall) Macdonald, Jeremy (Winter)

- Fall and Winter
- Prerequisite: [MATH 133 \(/study/2022-2023/courses/math-133\)](#) or equivalent
- Restriction: Not open to students in Mathematics programs nor to students who have taken or are taking [MATH 236 \(/study/2022-2023/courses/math-236\)](#), [MATH 247 \(/study/2022-2023/courses/math-247\)](#) or [MATH 251 \(/study/2022-2023/courses/math-251\)](#). It is open to students in Faculty Programs

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

[Bachelor of Arts \(B.A.\) - Major Concentration Computer Science](#)

(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-major-concentration-computer-science>)

[Bachelor of Arts \(B.A.\) - Major Concentration Computer Science](#)

(<https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-major-concentration-computer-science>)

[Bachelor of Arts \(B.A.\) - Major Concentration Software Engineering](#)

(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-major-concentration-software-engineering>)

Bachelor of Arts (B.A.) - Major  
Concentration Statistics  
(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-major-concentration-statistics>)

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Bachelor of Arts (B.A.) - Major  
Concentration Statistics  
(<https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-major-concentration-statistics>)

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Bachelor of Arts (B.A.) - Minor  
Concentration Mathematics  
(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-minor-concentration-mathematics>)

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Bachelor of Arts (B.A.) - Minor  
Concentration Mathematics  
(<https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-minor-concentration-mathematics>)

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Bachelor of Arts (B.A.) - Minor  
Concentration Science for Arts  
Students  
(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-minor-concentration-science-arts-students>)

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Bachelor of Arts (B.A.) - Minor  
Concentration Statistics  
(<https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-minor-concentration-statistics>)

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Bachelor of Arts (B.A.) - Minor  
Concentration Statistics  
(<https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-minor-concentration-statistics>)

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Bachelor of Arts (B.A.) -  
Supplementary Minor  
Concentration in Computer  
Science  
(<https://www.mcgill.ca/study/2022-2023>)

[2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-supplementary-minor-concentration-computer-science](https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-supplementary-minor-concentration-computer-science))

[Bachelor of Arts and Science \(B.A. & Sc.\) - Honours Cognitive Science \(https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-honours-cognitive-science\)](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-honours-cognitive-science)

[Bachelor of Arts and Science \(B.A. & Sc.\) - Interfaculty Program Cognitive Science \(https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-interfaculty-program-cognitive-science\)](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-interfaculty-program-cognitive-science)

[Bachelor of Arts and Science \(B.A. & Sc.\) - Major Concentration Physics \(https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-major-concentration-physics\)](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-major-concentration-physics)

[Bachelor of Arts and Science \(B.A. & Sc.\) - Major Concentration Software Engineering \(https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-major-concentration-software-engineering\)](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-and-science-ba-sc-major-concentration-software-engineering)

[Bachelor of Education \(B.Ed.\) - Secondary Mathematics \(https://www.mcgill.ca/study/2022-2023/faculties/education/undergraduate/programs/bachelor-education-bed-secondary-mathematics\)](https://www.mcgill.ca/study/2022-2023/faculties/education/undergraduate/programs/bachelor-education-bed-secondary-mathematics)

[Bachelor of Engineering \(B.Eng.\) - Minor Applied Artificial Intelligence \(22-25 credits\) \(https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-applied-artificial-intelligence-22-25-credits\)](https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-applied-artificial-intelligence-22-25-credits)

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

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Bachelor of Science  
(Agricultural and  
Environmental Sciences)  
(B.Sc.(Ag.Env.Sc.)) or  
Bachelor of Science (B.Sc.) -  
Major Environment -  
Environmetrics  
(<https://www.mcgill.ca/study/2022-2023/faculties/macdonald/undergraduate/programs/bachelor-science-agricultural-and-environmental-sciences-bscagenvsc-or-bachelor-science-bsc-major-2>)

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Bachelor of Science  
(Agricultural and  
Environmental Sciences)  
(B.Sc.(Ag.Env.Sc.)) or  
Bachelor of Science (B.Sc.) -  
Major Environment -  
Environmetrics  
(<https://www.mcgill.ca/study/2022-2023/faculties/environment/undergraduate/programs/bachelor-science-agricultural-and-environmental-sciences-bscagenvsc-or-bachelor-science-bsc-major-2>)

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Bachelor of Science (B.Sc.) -  
Honours Atmospheric Science  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-atmospheric-science>)

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Bachelor of Science (B.Sc.) -  
Honours Biology - Quantitative  
Biology  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-biology-quantitative-biology>)

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Bachelor of Science (B.Sc.) -  
Honours Chemistry:  
Biophysical Chemistry  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours>)

chemistry-biophysical-chemistry).

Bachelor of Science (B.Sc.) - Honours Computer Science  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-computer-science>)

Bachelor of Science (B.Sc.) - Honours Computer Science and Biology.  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-computer-science-and-biology>).

Bachelor of Science (B.Sc.) - Honours Neuroscience  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-neuroscience>)

Bachelor of Science (B.Sc.) - Honours Planetary Sciences  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-planetary-sciences>)

Bachelor of Science (B.Sc.) - Honours Software Engineering  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-software-engineering>)

Bachelor of Science (B.Sc.) - Liberal Program - Core Science Component Atmospheric and Oceanic Sciences  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-atmospheric-and-oceanic-sciences>)

Bachelor of Science (B.Sc.) - Liberal Program - Core Science Component Computer Science  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-computer-science>)

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-computer-science](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-computer-science))

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-physics](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-physics))

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-software-engineering](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-software-engineering))

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science))

[Bachelor of Science \(B.Sc.\) - Major Atmospheric Science and Physics](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science-and-physics)  
([https://www.mcgill.ca/study/2022-](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science-and-physics)

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science-and-physics](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-atmospheric-science-and-physics))

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-biology-quantitative-biology](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-biology-quantitative-biology))

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-biology-and-mathematics](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-biology-and-mathematics))

Bachelor of Science (B.Sc.) -  
Major Chemistry: Biophysical  
Chemistry  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-chemistry-biophysical-chemistry>)

Bachelor of Science (B.Sc.) -  
Major Computer Science  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-computer-science>)

Bachelor of Science (B.Sc.) -  
Major Computer Science -  
Computer Games  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-computer-science-computer-games>)

Bachelor of Science (B.Sc.) -  
Major Computer Science and  
Biology  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-computer-science-and-biology>)

Bachelor of Science (B.Sc.) -  
Major Environment -  
Atmospheric Environment and  
Air Quality  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-environment-atmospheric-environment-and-air-quality>)

Bachelor of Science (B.Sc.) -  
Major Environment -  
Atmospheric Environment and  
Air Quality  
(<https://www.mcgill.ca/study/2022-2023/faculties/environment/undergraduate/programs/bachelor-science-bsc-major-environment-atmospheric-environment-and-air-quality>)

Bachelor of Science (B.Sc.) -  
Major Neuroscience  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-neuroscience>)

science-bsc-major-neuroscience)

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Bachelor of Science (B.Sc.) -  
Major Neuroscience  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-neuroscience>)

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Bachelor of Science (B.Sc.) -  
Major Physics  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physics>)

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Bachelor of Science (B.Sc.) -  
Major Physics and Computer Science  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physics-and-computer-science>)

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Bachelor of Science (B.Sc.) -  
Major Physics and Geophysics  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physics-and-geophysics>)

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Bachelor of Science (B.Sc.) -  
Major Physics: Biological Physics  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physics-biological-physics>)

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Bachelor of Science (B.Sc.) -  
Major Physiology and Mathematics  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physiology-and-mathematics>)

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Bachelor of Science (B.Sc.) -  
Major Physiology and Physics  
(<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-physiology-and-physics>)

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Bachelor of Science (B.Sc.) -  
Major Software Engineering



<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-software-engineering>)

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

<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-statistics-and-computer-science>)

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

<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-minor-mathematics>)

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

<https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-minor-statistics>)




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<https://www.mcgill.ca>)

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