

**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 447 Introduction to Stochastic Processes (3 credits)

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

## Overview

Mathematics & Statistics (Sci) : Conditional probability and conditional expectation, generating functions. Branching processes and random walk. Markov chains, transition matrices, classification of states, ergodic theorem, examples. Birth and death processes, queueing theory.

### Terms: Winter 2023

Instructors: Addario-Berry, Louigi Dana (Winter)

- Winter
- Prerequisite: [MATH 323 \(/study/2022-2023/courses/math-323\)](#)
- Restriction: Not open to students who have taken or are taking [MATH 547 \(/study/2022-2023/courses/math-547\)](#).

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

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

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

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

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

[2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-major-concentration-statistics](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-major-concentration-statistics))

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

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

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

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

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

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

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

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

[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-](https://www.mcgill.ca/study/2022-2023/faculties/education/undergraduate/programs/bachelor-education-bed-secondary-mathematics)

[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 Mathematics](https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-mathematics)  
([https://www.mcgill.ca/study/2022-](https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-mathematics)

[2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-mathematics](https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-minor-mathematics))

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/20](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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2023/faculties/macdonald/und  
ergraduate/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/20](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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dergraduate/programs/bachelo  
r-science-agricultural-and-  
environmental-sciences-  
bscagenvsc-or-bachelor-  
science-bsc-major-2)

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Bachelor of Science (B.Sc.) -  
Honours Biology - Quantitative  
Biology  
([https://www.mcgill.ca/study/20](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-biology-quantitative-biology)  
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2023/faculties/science/undergr  
aduate/programs/bachelor-  
science-bsc-honours-biology-  
quantitative-biology)

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Bachelor of Science (B.Sc.) -  
Honours Earth System  
Science  
([https://www.mcgill.ca/study/20](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-honours-earth-system-science)  
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2023/faculties/science/undergr  
aduate/programs/bachelor-  
science-bsc-honours-earth-  
system-science)

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Bachelor of Science (B.Sc.) -  
Liberal Program - Core  
Science Component  
Mathematics  
([https://www.mcgill.ca/study/20](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-mathematics)  
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2023/faculties/science/undergr  
aduate/programs/bachelor-  
science-bsc-liberal-program-  
core-science-component-  
mathematics)

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Bachelor of Science (B.Sc.) -  
Liberal Program - Core  
Science Component Statistics  
([https://www.mcgill.ca/study/20](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-liberal-program-core-science-component-statistics)  
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2023/faculties/science/undergr  
aduate/programs/bachelor-  
science-bsc-liberal-program-  
core-science-component-  
statistics)

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-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 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 Earth System Science](https://www.mcgill.ca/study/2022-2023/faculties/science/undergraduate/programs/bachelor-science-bsc-major-earth-system-science)

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

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

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

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

[2023/faculties/science/undergraduate/programs/bachelor-science-bsc-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)

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

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

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

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

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


[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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