

**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 326 Nonlinear Dynamics and Chaos (3 credits)

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

## Overview

Mathematics & Statistics (Sci) : Linear systems of differential equations, linear stability theory. Nonlinear systems: existence and uniqueness, numerical methods, one and two dimensional flows, phase space, limit cycles, Poincare-Bendixson theorem, bifurcations, Hopf bifurcation, the Lorenz equations and chaos.

### Terms: Fall 2022

Instructors: Nave, Jean-Christophe (Fall)

- Fall
- Prerequisites: [MATH 222 \(/study/2022-2023/courses/math-222\)](#), [MATH 223 \(/study/2022-2023/courses/math-223\)](#)
- Restriction: Not open to students who have taken or are taking [MATH 376 \(/study/2022-2023/courses/math-376\)](#)

*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 \(B.A.\) - Minor Concentration Mathematics \(/https://www.mcgill.ca/study/2022-2023/faculties/arts/undergraduate/programs/bachelor-arts-ba-minor-concentration-mathematics\)](#)

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

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

[Bachelor of Arts \(B.A.\) -  
Supplementary Minor  
Concentration in Mathematics  
\(https://www.mcgill.ca/study/2022-](https://www.mcgill.ca/study/2022-2023/faculties/basc/undergraduate/programs/bachelor-arts-ba-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-](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-](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 Commerce  
\(B.Com.\) - Major  
Concentration Mathematics for  
Management Students  
\(https://www.mcgill.ca/study/2022-](https://www.mcgill.ca/study/2022-2023/faculties/desautels/undergraduate/programs/bachelor-commerce-bcom-major-concentration-mathematics-management-students)

[2023/faculties/desautels/undergraduate/programs/bachelor-commerce-bcom-major-concentration-mathematics-management-students](https://www.mcgill.ca/study/2022-2023/faculties/desautels/undergraduate/programs/bachelor-commerce-bcom-major-concentration-mathematics-management-students))

[Bachelor of Education \(B.Ed.\)  
- 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  
\(B.Eng.\) - Honours Mechanical  
Engineering  
\(https://www.mcgill.ca/study/2022-](https://www.mcgill.ca/study/2022-2023/faculties/engineering/undergraduate/programs/bachelor-engineering-beng-honours-mechanical-engineering)

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

[Bachelor of Engineering  
\(B.Eng.\) - 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  
\(https://www.mcgill.ca/study/2022-2023/faculties/macdonald/undergraduate/programs/bachelor-science-agricultural-and-environmental-sciences-bscagenvsc-or-bachelor-science-bsc-major-2\)](https://www.mcgill.ca/study/2022-2023/faculties/macdonald/undergraduate/programs/bachelor-science-agricultural-and-environmental-sciences-bscagenvsc-or-bachelor-science-bsc-major-2)

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

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

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

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

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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>)

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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>)

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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>)

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

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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 Statistics

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



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