

PATRICK WALLS

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Employment

Associate Professor Teaching, University of British Columbia, 2020–Present
Instructor, University of British Columbia, 2015–2020
Postdoctoral Fellow, McMaster University, 2013–2015

Education

PhD, University of Toronto, Mathematics, 2007–2013
MSc, University of British Columbia, Mathematics, 2005–2007
BSc, University of Calgary, Mechanical Engineering, 1999–2005
BSc, University of Calgary, Mathematics, 1999–2005

Awards

2019 Faculty of Science Excellence in Service Award

Teaching

Session	Course	Title	Students
2025W1	MATH 307	Applied Linear Algebra	120
2025W1	MATH 100	Differential Calculus with Applications	342
2025W1	MATH 100	Differential Calculus with Applications	467
2024W2	MATH 441	Mathematical Modelling: Optimization Problems	38
2024W2	MATH 210	Introduction to Mathematical Computing	73

2024W2	MATH 210	Introduction to Mathematical Computing	17
2023W2	MATH 441	Mathematical Modelling: Optimization Problems	43
2023W2	MATH 210	Introduction to Mathematical Computing	80
2023W2	MATH 210	Introduction to Mathematical Computing	34
2023S1	MATH 307	Applied Linear Algebra	76
2022W2	MATH 210	Introduction to Mathematical Computing	118
2022W1	MATH 307	Applied Linear Algebra	55
2022W1	MATH 441	Mathematical Modelling: Optimization Problems	47
2022S1	MATH 307	Applied Linear Algebra	99
2021W2	MATH 210	Introduction to Mathematical Computing	184
2021W2	MATH 254	Multivariable and Vector Calculus for Mechanical Engineering	131
2021W1	MATH 258	Differential Equations for Mechanical Engineering	124
2021W1	MATH 307	Applied Linear Algebra	115
2021S1	MATH 307	Applied Linear Algebra	102
2020W2	MATH 254	Multivariable and Vector Calculus for Mechanical Engineering	123
2020W1	MATH 258	Differential Equations for Mechanical Engineering	118
2020W1	MATH 210	Introduction to Mathematical Computing	187
2020S1	MATH 307	Applied Linear Algebra	106
2019W2	MECH 358	Engineering Analysis	108
2019W2	MATH 254	Multivariable and Vector Calculus for Mechanical Engineering	123
2019W1	MATH 258	Differential Equations for Mechanical Engineering	127
2019W1	MATH 210	Introduction to Mathematical Computing	118
2019S1	MATH 307	Applied Linear Algebra	107
2018W2	MECH 358	Engineering Analysis	106
2018W2	MECH 222	Multivariable and Vector Calculus for Mechanical Engineering	121
2018W1	MECH 221	Differential Equations for Mechanical Engineering	124
2018W1	MATH 210	Introduction to Mathematical Computing	109
2018W1	MATH 100	Differential Calculus with Applications to Science and Engineering	141
2018W1	DSCI 511	Programming for Data Science	69
2017W2	MECH 222	Multivariable and Vector Calculus for Mechanical Engineering	129
2017W2	MATH 210	Introduction to Mathematical Computing	97
2017W1	MECH 221	Differential Equations for Mechanical Engineering	133
2017W1	MATH 100	Differential Calculus with Applications to Science and Engineering	101
2017W1	MATH 100	Differential Calculus with Applications to Science and Engineering	197

2017W1	DSCI 511	Programming for Data Science	42
2017S1	MATH 215	Elementary Differential Equations I	125
2016W2	MECH 222	Multivariable and Vector Calculus for Mechanical Engineering	130
2016W2	MATH 210	Introduction to Mathematical Computing	107
2016W1	MECH 221	Differential Equations for Mechanical Engineering	123
2016W1	MATH 180	Differential Calculus with Physical Applications	213
2016W1	MATH 100	Differential Calculus with Applications to Science and Engineering	115
2015W2	MATH 210	Introduction to Mathematical Computing	88
2015W2	MATH 152	Linear Systems	103
2015W2	MATH 152	Linear Systems	235
2015W1	MECH 221	Differential Equations for Mechanical Engineering	130
2015W1	MATH 104	Differential Calculus with Applications to Social Sciences	129
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Projects

Mathematical Python

patrickwalls.github.io/mathematicalpython

Web-based open source textbook on mathematical computing with Python and Jupyter. Based on my course notes for MATH 210, consists of 25+ Jupyter notebooks with exercises and covers basic Python programming and numerical methods.

Computational Teaching and Learning

in Mathematics (CTLMath)

ctlmath.github.io/birs2025

CTLMath is an organizational framework for teaching and learning with open source mathematical software and web-based computational resources. Designers create computational learning material with Python and Jupyter and design autograded assessments with nbgrader. Coordinator provides training for Python TAs and supervision for autograding workflow. Coordinator consults and collaborates with instructors to setup and deliver computational learning activities aligned with course learning goals. Our team of coordinator, designers, graders, and TAs provide computational teaching and learning experiences in 10+ courses in UBC Math for over 1000 students each year.

MATH 210 Introduction to Mathematical Computing

Course redesign with web-based open source computational resources at the core the design. Students login whenever and wherever they choose and write Python code in Jupyter

notebooks using their own devices. Lectures are live-coding events in which students apply basic Python programming to standard numerical methods in mathematics. The design of the course encourages students to play with code both inside and outside of the classroom. This is a big change from past versions of the course which were constrained by proprietary software and restricted access to computer labs. Free unrestricted access to computational resources on their own devices gives students a sense of ownership of their work and allows them to spend more time engaged in computational thinking.

MATH 360 Mathematical Modelling

ubcmath.github.io/MATH360

New course co-created with Prof. Lindsey Daniels. Designed as a flipped classroom with pre-lecture activities in Jupyter notebooks and custom course notes built with Jupyter Book. The course explores deterministic, stochastic and data-driven models including systems of ordinary differential equations, probability distributions, kernel density functions, linear and logistic regression. The course develops a systematic approach to mathematical modelling following the modelling process with strong emphasis on computational methods for simulation and visualization.

MATH 307 Applied Linear Algebra

ubcmath.github.io/MATH307

Course redesign with focus on matrix decompositions LU, QR, SVD and the discrete Fourier transform. Matrix computations with mathematical software Python, SciPy and Jupyter. Redesign includes custom course notes compiled into web-based open source textbook built with JupyterBook.

Python for UBC MATH

ubcmath.github.io/python

Instructional material for UBC students to get up and running with Python and Jupyter. Introduces JupyterLab development environment and basic Python programming for mathematical computing. The notes are a reference for courses in calculus, linear algebra, differential equations and optimization which include mathematical computing assignments with Python and Jupyter.

MATLAB for UBC MATH

ubcmath.github.io/matlab

Instructional material for UBC students to get up and running with MATLAB Online. Introduces MATLAB development environment and basic MATLAB programming for mathematical computing. The notes are a reference for courses in calculus, linear algebra, differential equations and optimization which include mathematical computing assignments with MATLAB.

MATH 316 Partial Differential Equations

ubcmath.github.io/MATH316

Web-based open source textbook on partial differential equations built with JupyterBook.

MATH 441 Discrete Optimization Problems

Mathematical modelling and optimization course redesign including linear optimization, combinatorial optimization and convex optimization.

Interactive Course Map

ubcmath.github.io/coursemap

Interactive data visualization of the undergraduate mathematics program at UBC built with D3. Students navigate course prerequisites and program requirements.

mbgrader

github.com/patrickwalls/mbgrader

Custom web application for batch grading MATLAB assignments. “Batch grading” means the app compares numeric data from all student responses and creates a batch for each unique response. Batches are then reviewed and graded by a human grader with feedback. Ideally, mbgrader reduces hundreds of responses to less than 10 batches for a question. Used in MATH 152 and impacts 1000+ students annually.