Analysis and Topology Course Notes

This volume brings together twenty-five chapters of course notes in analysis and topology, developed over many years of teaching at the University of Ottawa. It is intended as a structured and self-contained reference for students working through the core topics of real analysis, metric and topological spaces, differential forms, and selected extensions into functional analysis and dynamical systems.

The material is organized into five parts, reflecting the arc of several upper-year courses in analysis and topology. The early chapters cover sequences, continuity, compactness, and integration with rigour and attention to detail. Later sections take up topics such as normed vector spaces, uniform convergence, Fourier series, algebraic topology, and bifurcation theory. Each chapter includes definitions, examples, solved problems, and exercises designed to reinforce understanding and encourage further exploration.

These notes are not a textbook in the usual sense, nor a replacement for guided instruction. But they may be useful to students reviewing core concepts, bridging between courses, or working independently through the foundations of analysis and topology.

About the Author

Patrick Boily is an Assistant Professor in the Department of Mathematics and Statistics at the University of Ottawa. He earned his Ph.D. in Mathematics in 2006 and is the author of several textbooks on mathematics, statistics, and data science, available at idlewyldanalytics.com.

Since 1999, he has taught more than 75 courses at the University of Ottawa, the Université du Québec en Outaouais, and Carleton University. From 2012 to 2019, he launched and managed Carleton University's Centre for Quantitative Analysis and Decision Support (CQADS), and he was a founding member of the Data Action Lab, which offered workshops, short courses, and consulting services in data analysis.

Patrick's academic work focuses on the application of mathematics and statistics to evidence-based decision support. He has provided consulting services to a wide range of public and non-profit organizations, including United Way, the Public Health Agency of Canada, the Canadian Air Transport Security Authority, and the Department of National Defence. His areas of expertise include operations research, data science and predictive analytics, stochastic modelling, and simulation.

Patrick is an avid hockey player, cross-country skier, cyclist, mountain biker, swimmer, and paddleboarder; he enjoys crosswords, playing the guitar, and watching British murder mysteries. He lives with his family in Wakefield, Quebec.

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