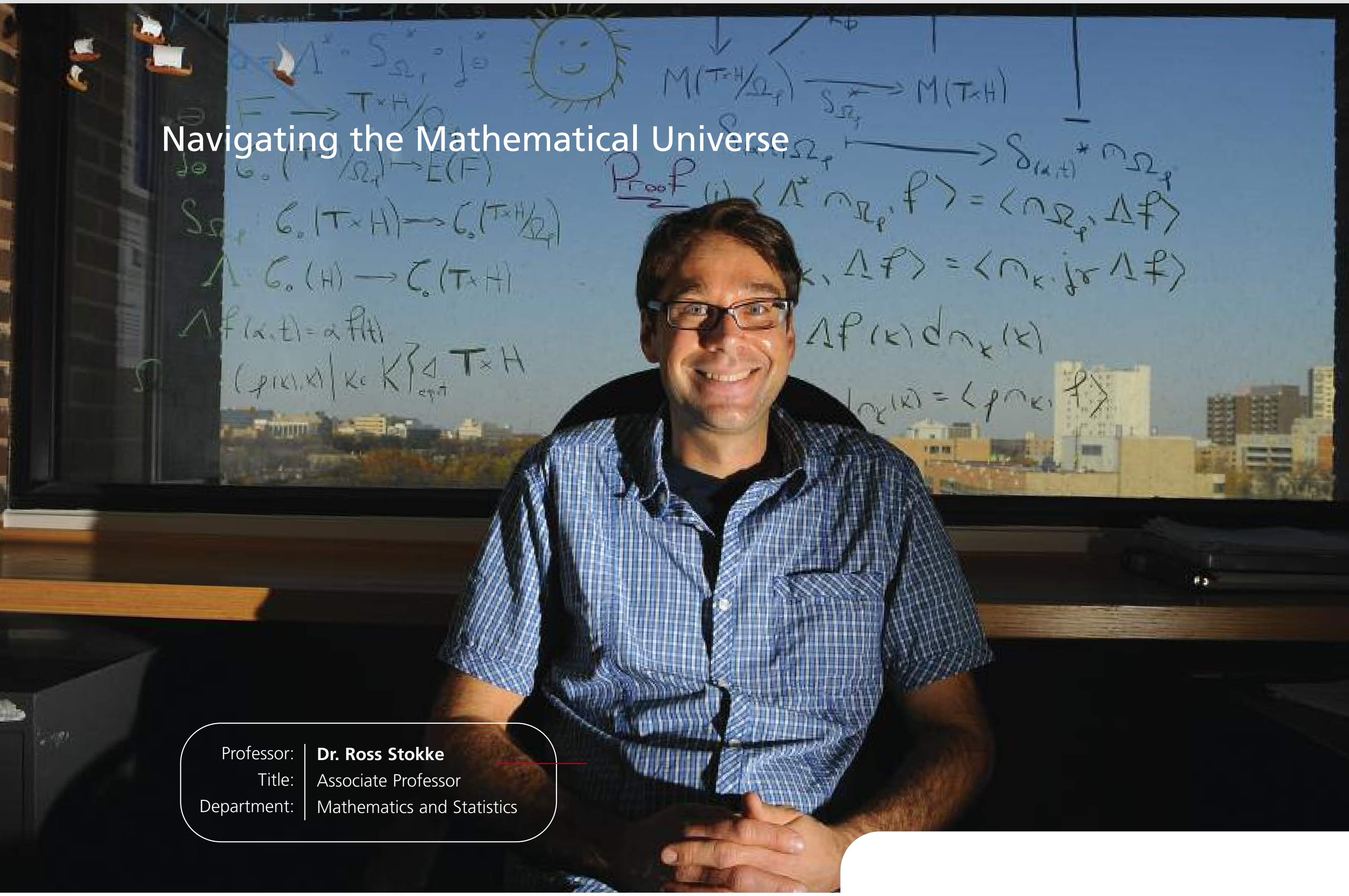
Navigating the Mathematical Universe



Professor: **Dr. Ross Stokke**
Title: Associate Professor
Department: Mathematics and Statistics

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Dr. Stokke describes himself as a theoretical mathematician and marvels at how pure mathematics can result in very useful mathematics. His research area may be traced back to Fourier's discovery, which revolutionized both physics and mathematics: any wave function, no matter how complex, can be broken down into an infinite sum of simple sine and cosine functions. In particular, classical harmonic analysis, still a thriving area of study, was borne from Fourier's work. This area of analysis usually occurs on the real line, the integers, or the unit circle, all of which are topological and algebraic objects known as locally compact groups.

Beyond these particular mathematical objects, there is a great wealth of other locally compact groups that are of fundamental importance in math and physics. Dr. Stokke's research is in Abstract Harmonic Analysis where, in opposition with the classical theory, the mathematics occurs in arbitrary locally compact groups. It has been shown that these topological groups always have a Haar measure allowing for the measure of the size of sets. As such, locally compact groups provide an extremely rich mathematical environment in which the fields of mathematical analysis, algebra and topology blend in an elegant theory, a mathematical universe presenting a seemingly infinite arena of problems and possibilities. In navigating this world, play is as essential as knowledge and imagination. The quest is never-ending and therein lies its appeal.

Dr. Stokke's particular area of research involves using the tools of functional analysis to study the many Banach algebras and operator algebras that surround any locally compact group. Here is revealed a beautiful tapestry of interconnected mathematical objects. In essence, Dr Stokke's research involves studying these objects in relation to each other and, especially, in relation to the locally compact group — the sun at the centre of this mathematical solar system. The truth is rarely obvious but Dr. Stokke finds motivation in the "good, beautiful mathematics" in which he is immersed. Applications are not necessarily immediately forthcoming from theoretical mathematics, but as in the case of Riemann's non-Euclidean geometry, which provided the mathematical framework for Einstein to describe his theory of relativity, the wait is often worthwhile. ■