This lively and accessible book describes the theory and applications of Hilbert spaces, and also presents the history of the subject to reveal the ideas behind theorems and the human struggle that led to them.

The authors begin by establishing the concept of “countably infinite,” which is central to the proper understanding of separable Hilbert spaces. Fundamental ideas such as convergence, completeness, and dense sets are first demonstrated through simple familiar examples and then formalized. Having addressed fundamental topics in Hilbert spaces, the authors then go on to cover the theory of bounded, compact, and integral operators at an advanced but accessible level. Finally, the theory is put into action, considering signal processing on the unit sphere, as well as reproducing kernel Hilbert spaces. The text is interspersed with historical comments about central figures in the development of the theory, which helps to bring the subject to life.

Rodney A. Kennedy is a Professor in the Research School of Engineering and the Head of the Applied Signal Processing research group at the Australian National University, Canberra. He has won a number of prizes in engineering and mathematics, including UNSW University and ATERB Medals. He has supervised more than 40 Ph.D. students and co-authored approximately 300 research papers. He is a Fellow of the IEEE.

Parastoo Sadeghi is a Fellow in the Research School of Engineering, at the Australian National University, Canberra. She has published around 90 refereed journal and conference papers, and received two IEEE Region 10 paper awards. She is a Senior Member of the IEEE.