# MATH 4810/5810 Hilbert Spaces
## Course Projects

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1. $L^p$-spaces (Sam, Aug 8, 10:40am)
2. The Theorem of Stone–Weierstraß (Harman, Aug 11, 9:00am)
3. The Stern–Gerlach experiment (Maddox)
4. The experiments by Alain Aspect et al. which confirmed Bohr's interpretation of quantum mechanics
5. Representations of the Lie algebra $\mathfrak{su}(2,\mathbb{C})$ (Bryn)
6. Coherent states (Cooper)
7. Wigner's theorem
8. Bargmann's theorem
9. The EPR paradox and Bell's inequality
10. Quantum Logic from a mathematical point of view (Percy)
11. Pauli's derivation of the spectrum of the hydrogen atom (Marissa)
12. Fourier analysis in Hilbert spaces: Fourier series and the Legendre polynomials
13. Orthogonal polynomials: Laguerre and Hermite polynomials (Nourah)
14. Vibrations of a (circular) membrane (with outlook to the problem whether one can hear the shape of a drum)
15. The spin in quantum mechanics (Adan)
16. Clifford algebras and spin geometry (Sam Schw.)
17. The Dirac Operator (Jeremy)
18. The Born–Oppenheimer approximation
19. The geometric phase in quantum mechanics (Megan)
20. Quantum entanglement (Salma)
21. Quantum Error Correction on Infinite-Dimensional Hilbert Spaces (Jazzy)
22. Foundations of Quantum Computing
23. The Weyl-Moyal product and deformation quantization (Kerem)
24. Quantum transistors and quantum interference
25. Computation and visualization of quantum mechanical operators with python (Matthew)
26. Computation of eigenvalues, eigenstates, and time evolution of states of a quantum mechanical particle in a double or triple well potential with python or MATLAB (Christian)