In this talk I will give an introduction to topological phases of matter and topological superconductivity as well as discuss experimental progress in realizing such phases in materials and observing spectroscopic signatures of those phases with the focus on scanning tunneling microscopy (STM) experiments. Topological phases are distinguished by the unusual behavior at the edges (e.g. gapless boundary states) stemming from the non-trivial topology of the bulk. Such behavior at the edges cannot be realized independently on a local lower-dimensional system (i.e. without the underlying bulk). Topological superconductors and their edge excitations – Majorana bound states – are highly sought after for applications in topological quantum computing. I will introduce the platform of magnetic atoms on a superconductor and discuss different mechanisms that give rise to topological superconductivity in this system – for different magnetic ground states, with or without spin-orbit coupling.