Project Title	Detecting bioweapons with stand-off Raman spectroscopy
Supervisor	Dr Christopher Rowlands
Theme(s)	Biomedical Sensing Diagnostics and Imaging
Project Type	Lab based
Project Description	Bacillus anthracis, commonly known as anthrax, is a potent bioweapon. Having first been used in World War Two, there have been a number of attacks and close calls, ranging from a 1979 accidental release of spores in the former Soviet Union which killed 69 people, several attempts at terrorist attacks by the Aum Shinrikyo cult in Japan in the 1990s, and the 2001 anthrax letter attacks on senators in the United States. Anthrax is a powerful bioweapon not only due to its pathogenicity, but because it can form spores which are extremely difficult to eradicate. These spores are stable for decades, and are resistant to radiation, ultraviolet light, desiccation, extreme heat and cold, as well as a number of chemical disinfectants. Identification and detection of these spores is critical to decontamination of an area after a suspected attack, but for obvious reasons, it is not a good idea for a user to get too close to a suspected contamination. Finding a way to detect these spores at ranges of 10m and above would be extremely beneficial for first-responders who wouldn't have to risk their lives to test a suspected release site. One way to perform this detection is using Raman microscopy. The student on this project will be responsible for building a system to perform Raman detection at long distances, without compromising on sensitivity. This system will be able to detect Bacillus subtilis (a benign analog of anthrax) without the need for the user to come near the sample location, and the project will involve some optical engineering, programming, and potentially some electrical engineering.