

Senior Project Proposal

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I. Title of Project:

Developing a Lab for Fourier-Transform Infrared (FTIR) Spectroscopy

II. Statement of Purpose:

In high school and college, we are surrounded by courses laid out for us by someone who has developed the course. In a science class, students perform labs to do a deeper study into a certain topic. But how can a school perform those labs when they might not have the same materials required? How does someone develop a course that is tailored to the school? I hope that this internship will provide insight into the techniques used by certain schools to develop a lab procedure for their students. I also hope to get experience in a lab setting.

III. Background:

I have had an interest in going into a career that has lab work as part of the position. I loved the labs that I did in each grade for both chemistry and biology. I thought pursuing a field where work was performed in a lab might be worth exploring more in the future. AP Chemistry and Honors Biology got me thinking of majoring in either chemistry or biology, even the possibility of both. In order to know for sure, I would like to get more experience in a lab setting.

I knew I wanted to have an opportunity to be in a lab setting, but I did not know how or what I wanted to do. I sent out multiple essays to multiple different possible sites. The one I was very interested in was from Embry Riddle Aeronautical University where I would be helping to design a FTIR lab procedure using materials from the college.

IV. Prior Research:

Fourier-transform infrared (FTIR) spectroscopy is a way of identifying organic, polymeric, and inorganic materials. It has been a technique that has been used in labs for over 70 years. It is also used in many sciences, such as forensics, to identify materials in a substance.

How does it work? A sample is scanned using infrared light. Some of the light will be absorbed into the sample while the rest of the light will be detected, creating a finger-print like pattern. This pattern will be unique to the sample and will aid in identifying compounds it contains. This process is helpful in identifying unknown materials. It can also help identify how much of the substance is in the sample. The height of the peaks the spectroscopy shows will indicate if there is a lot of that particular substance in the sample. This method is used in both general chemistry and organic chemistry because it can identify materials in compounds. This is helpful in chemistry to find out what is in a sample, and measure how much is in it.

V. Significance:

This research project aims to help bridge the gap between General Chemistry and Organic Chemistry. FTIR Spectroscopy labs provide the opportunity to apply General Chemistry and introduce Organic Chemistry because it identifies materials in a sample. This project will look into both the process of troubleshooting a lab, and the challenges to developing a course.

VI. Description:

I am going to create an experiment for a college class. This experiment will involve developing a step-by-step procedure on how to perform the Fourier-Transform Infrared (FTIR) Spectroscopy lab. I will be performing multiple labs to see if I can use one of them for the course. The course I develop would be used by Embry Riddle Aeronautical University for a second semester laboratory. This will be a bridge for the freshmen from general chemistry to organic chemistry.

VII. Methodology:

I am going to be testing a variety of compounds to include in the lab course. I am also going to be trouble-shooting the experiment to see how well it will work. If we decide to, I will also be getting volunteers to test how successful the lab is in explaining the concepts within.

VIII. Problems:

One problem I expect to encounter is trouble with the testing. One test might have an inconclusive answer in the data. One way I hope to solve this is to have multiple different ways of running the test. I also hope to work with

multiple different samples to see if it was the test or the sample that is getting the inconclusive answer.

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