

Chem 221 Syllabus

Course objectives

This course is an introduction to instrumental methods of analysis - that is, the measurement of chemical systems using instruments.

This course has been developed to provide students with the background theory and principles of operation of modern instrumentation used for chemical analysis. Specifically, the objectives of this course are to initiate the students in the theory, operation and uses of

Optical spectroscopy,
Mass spectrometry,
Chromatography
Nuclear Magnetic Resonance spectroscopy
Electrochemistry, and

The students will also develop an understanding of the types of samples amenable to each instrument and the kind of information attainable. Specifically, we will discuss

the chemical and/or physical principles exploited during the measurement
how the instrument actually makes the measurement, and
some of the techniques used to improve the analytical figures of merit, such as accuracy, precision and sensitivity.

Throughout the course, the principles underlying common instrumental methods will be presented and discussed in detail. Each type of instrument has a unique set of strengths and weaknesses that makes it suitable for some measurements but not others. For example, some techniques are best for qualitative determinations while others are excellent for providing quantitative information regarding the analyte(s). During this course, you should develop an understanding of the analytical capabilities of a number of instrumental methods and ultimately be able to suggest suitable instrumental methods for particular analytical problems.

One thing you will not learn in this course is how to operate a particular instrument, but you don't need to! Each class of instrument is based on a similar measurement of a chemical or physical property. Therefore, if you understand the basic operation of each method, you should be able to operate any instrument based on similar principles. Specifically, in order to choose the best instrument for the task at hand, we will consider:

1. the property or quantity of the chemical system to be measured

Final Exam	400 points
Total	1000 points