

Analytical Chemistry

CHM1102H *Developing Techniques in Analytical Chemistry*

(Cross-listed Undergraduate CHM414H)

CHM1103H *Advanced Topics in Analytical Chemistry*

(Cross-listed Undergraduate CHM414H - UTM)

CHM1104H *Separation Science*

(Cross-listed Undergraduate CHM416H)

CHM1106H *Lab Instrumentation*

(Cross-listed Undergraduate CHM417H)

CHM1107H *The -Omics Revolution and Mass Spectrometry*

Biology is in the midst of a 'systems' revolution, which emphasizes the evaluation of interactions between hundreds-thousands of biomolecules in parallel. This paradigm, which has spawned the ever-growing number of '-Omics' disciplines, has been driven in part by tools developed by analytical chemists (e.g., microfluidics, multiplexed separations, high resolution spectroscopy). One analytical technique that has had a particularly important role in the revolution is mass spectrometry. In CHM 1107, we take a detailed look at mass spectrometry and associated methods, and survey the state-of-the-art in other analytical tools that are driving the -Omics revolution.

CHM1150H *Advances in Electroanalytical Chemistry and Electrochemical Sensors*

This course will provide the fundamentals of electrochemistry as applied to solve problems of analysis, and will examine potentiometry and voltammetry as the basis for problem solving. The course will focus on electrode types and materials, surface derivatization methods for preparation of chemically-modified electrodes, pulse forms and sequences for voltammetry, electron transfer and relay systems for 'molecular wiring', and examples of applications of technology in solving problems. Electrochemical sensors such as those for glucose analysis will serve as a platform for consideration of device engineering, and to examine requirements for commercialization of device technologies.

CHM1152H *Chemical Sensors*

The fundamentals of design and operation of all major types of chemical sensors and biosensors will be presented and critically evaluated. Emphasis will be placed on the problems that are encountered with the development of reliable and practical biosensors, using case histories of commercial devices as a point of reference. A survey of the physical principles of function of electrochemical, optical and piezoelectric transducers will be used to illustrate how different systems can be advantageous in handling different applications. Discussion will focus on examination of the technical problems and potential solutions that are required for further development of sensor technologies.

CHM1157H *Applications of Chemometrics*

This course will focus on selected methods of statistics and mathematics as applied to topics in analytical chemistry. Topics will include: factor and principle components analysis, optimization theory, experiment design, neural networks, fuzzy logic, pattern recognition, cluster designation, and transformations and filtering for spectroscopy and imaging. The intention is to provide an overview, to define elements of a 'toolbox' that has practical use. Examples of approaches to problem solving, software, and sources of software for applications of chemometrics will be used to highlight topics, rather than detailed mathematical solutions.

CHM1190Y *Analytical Chemistry Seminar*