

Development of General Chemistry II Lab Manual and Incorporation of Modern
Instrumentation

Instructors Sabbatical Leave Status:

Full time hire: August 2004

Previous Sabbaticals: 0

Background of Sabbatical Project:

General Chemistry II (Chem V01BL) is the second semester of the one year General Chemistry sequence. The course would be considered a freshman level class at most universities and is fully transferable. It is generally required for transfer for chemistry, biology, and some engineering majors. The course meets twice weekly for a total of six hours per week and is offered in both the Fall and Spring Semester each year with a total of six sections (approximately 150 students) per year. Enrollment in the course has continually grown possibly due to a more competitive transfer environment and the increase cost of taking classes at CSU's and UCs. Furthermore, as the department prepares its AS- Transfer degree, I expect the demand for the class to continue to increase.

The curriculum for the class has not been revised in any way since I have been a faculty member (7 years), and I would estimate well before that due to the dated nature of the experiments. This is mainly due to the class being mainly taught by part-time instructors for many years and a lack of resources to purchase equipment needed to update the curriculum.

Purpose of the Sabbatical Project

The purpose of the sabbatical project is to revise the curriculum of the General Chemistry II laboratory to reflect current topics and align its content with neighboring colleges and universities. This will involve the development of approximately 16 experiments and the repair, setup, and testing of recently donated or purchased equipment.

Components of the Project

Development of laboratory experiments and preparation of Lab Manual

The current General Chemistry II Laboratory curriculum focuses on methods of analysis and topics that do not reflect the current state of modern chemical analysis, nor does it take advantage of recently acquired instrumentation. In addition, the curriculum includes some commercially available experiments which have an increased cost to students compared to lab manual that will be produced from this project. The laboratory manual preparation will require research into the current laboratory components of neighboring colleges and universities to better align curriculum, and journal research in order to find best practices from other chemistry programs. Labs will then need to be tested in order to determine their value to student learning as well as their ability to be performed accurately and safely. The laboratory manual will then need to be written, edited and proofread. This will be a significant undertaking. By comparison, the General Chemistry

I Laboratory Manual is approximately 120 pages, and I would estimate that the General Chemistry II Laboratory Manual would be of a similar length. Due to differences in available laboratory equipment and teaching emphasis, commercially available lab procedures are not a viable option, so each lab will be an original work.

Installation, Repair and Testing of recently acquired laboratory equipment.

The Chemistry department has been fortunate to receive several donated pieces of equipment as well as equipment from the recent STEM grant. The equipment is not being used as intensely as possible due to a lack of well written and test laboratory assignments. In addition, some of the donated equipment needs repair or set up to be functional. Items that will get attention in this project include:

Induced Coupled Plasma- Mass Spectrometer (ICP-MS). This piece of equipment measures trace amounts of metals in samples typically from soil or water samples. It is in need of installation as well as some repairs to be operational. In addition, laboratory procedures need to be developed for its use.

Atomic Absorption Spectrometer (AA) – This piece of equipment measures trace amounts of elements in samples. Again, it needs significant effort to calibrate, test, and development for its use as well as written laboratory procedures.

Scanning UV/VIS Spectrometers- These machines are used to analyze samples to determine their chemical composition. Currently, they are in working order, but are only used in one experiment which limits their exposure to students.

Benefits to students

This class has traditionally had a poor retention rate. One of the reasons for the large number of student withdrawals is because it contains information that has not been updated with the latest research and thus does not seem relevant to their lives in the twenty-first century. By incorporating the latest equipment available, students will get exposure to much more modern instrumentation. This exposure will make them not only better prepared for their future studies, but also improve their employment and internship prospects since these analytical methods are used at companies such as Amgen, Fruit Growers Lab, and many others. The lab manual from this project will also be much cheaper than the current lab manual, with it being posted on the internet for download or available as a hard copy at the bookstore for less than \$10.

Benefits of Sabbatical Project to Ventura College

This project will present a much more engaging experience to students enrolled in the General Chemistry II lab course. The goal is to not only instruct students, but also motivate students to continue to pursue studies in the STEM field. This will hopefully increase the number of STEM degrees and certificates awarded at Ventura College. In addition, other departments such as environmental science and water science will be able to use the modern instrument that this project will set up.

Conclusion

The primary goal of any educational institution is to give its students the skills and knowledge required to be successful in their chosen careers. By providing the best curriculum and laboratory experience to students, we will give our future science and engineering students a better understanding of how chemistry fits into their profession.