

January, 2014

To whom it may concern:

Over the last three years, the Chemistry Department at the College of Saint Benedict/Saint John's University has developed and implemented a new curriculum with the help of a \$200,000 Transforming Undergraduate Education in the Science (TUES) grant from the NSF. We have replaced the traditional first two years of General Chemistry I and II and Organic Chemistry I and II (all with attached labs) with four new 4 credit courses and four new separated lab courses (0 or 1 credit). We devised these courses to follow the new guidelines of the Committee on Professional Training (CPT) of the American Chemical Society and to integrate our teaching of the traditional sub-disciplines of chemistry. In addition we have changed our upper division courses, replacing traditional 4 credit in-depth classes with attached labs with a series of half semester topic course dealing with relevant and modern topics and a separate integrated lab experience which prepares students for undergraduate research.

Our first 4-credit and sole introductory course, CHEM 125 – Introduction to Chemical Structure and Properties, develops a building understanding of structure starting with atoms and ions and continues through solid metals and molecules. 3D structure and stereochemistry is then discussed followed by energy and conformational analyses of acyclic and cyclic molecules. Intermolecular forces that result from structure and geometry lead to biological molecules and chromatography. More complex network solids and transition metal complex follow. A more nuanced understanding of bonding arises from a study of molecular orbitals and the properties of aromatic and anti-aromatic molecules. Finally reactivity that derives from structure follows as students study Lewis acids and bases and draw mechanisms using curved arrows to understand these reactions.

For the next three four-credit, foundation-level course (CHEM 250 - Reaction of Nucleophiles and Electrophiles I, CHEM 251 - Reaction of Nucleophiles and Electrophiles II, and CHEM 315 - Advanced Reactions), we combined a semester each of organic, inorganic and biochemistry into three integrated courses based on the common principle of reactivity. Our first of two “analysis” classes, CHEM 255 - Foundations of Macroscopic Analysis, combine a half-semester each of Analytical and Physical Chemistry. We use a hybrid, non-introductory texts for these course. We have also worked with the ACS to construct final exams using questions from different ACS final exams.

Our new foundation labs course are not based on proof-of-principle experiments (that are designed to reinforce principles learned in traditional classes). Rather the first three are skills-based classes in which students are given unique unknowns for identification. In our first lab (CHEM 201 -Purification and Characterization Lab 1), student purify unique unknown mixtures by filtration, liquid-liquid extraction, sublimation, distillation, and acid/base extractions. They

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then identify their unknown using IR, UV/Vis, and ^{13}C and ^1H -NMR. The second lab (CHEM 202 - Purification and Chromatography), students purify unknowns using size exclusion, ion-exchange, affinity, reverse phase, and silica gel chromatography, and characterize their samples with spectroscopy (including MS) and electrophoresis. In the third lab (CHEM 203 - Synthesis) the students carry out a series of inorganic, organic, and biochemical syntheses (including fluorescent proteins through transformation of bacterial cells) and use spectroscopy (including mass spectroscopy) to analyze their samples. In final foundation lab (CHEM 202 - Measurement) students perform classical Analytical and Physical Chemistry experiments.

To get a better understanding of the content and delivery of our first two years of course, please follow the web links below:

- catalog descriptions and goals and objectives for each of our new 4-credit courses and lab courses (0 or 1 credit) taken by students in their first two years:
<http://www.csbsju.edu/Chemistry/Our-Curriculum.htm>.
- Additional information including syllabi, daily schedules, etc for each of our new 4-credit courses and lab courses (0 or 1 credit) taken by students in their first two years:
<http://www.csbsju.edu/Chemistry/Our-Curriculum/Course-Syllabi-and-Daily-Schedules.htm> .

I hope that this gives you enough information to make an informed decision about the courses we offer.

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