

Introduction

The faculty in the Department of Chemistry are committed to providing a high quality learning experience for our students. While we recognize the fundamental importance of content knowledge of chemistry, we emphasize the practice of doing chemistry. Content knowledge gained in coursework is reinforced by practical laboratory work, both of which are foundational in the research projects that our students develop and conduct. This variety of learning activities outlines a process by which students are transformed into competent professionals in graduate study, medicine, research, business and teaching. Naturally a variety of learning activities requires a variety of assessment strategies that we use to measure our student successes. Our assessment strategies are designed to address our curricular goals and are described below. Our curricular goals are consistent with the goals of the Department of Education. The alignment of the goals of the Chemistry and Education Departments is described at the end of this document.

Assessment of Content Knowledge

Assessment of content knowledge and scientific practice has been and will continue to be an important pedagogical tool in the William Jewell College Department of Chemistry. Students of chemistry are assessed in multiple formats that include, but are not limited to traditional homework, quizzes, and examinations. In addition, students conduct research projects in which they develop and execute an original research proposal. Their progress and understanding of the project is evaluated over a two-year period by assessment of a proposal (complete with timeline, budget, and annotated bibliography), presentation of project progress, and written and oral presentation of their senior thesis. To gauge content knowledge the results of the Student Knowledge Self-Assessment survey has been and will continue to be monitored in order to assess student confidence and understanding of the pertinent content areas in chemistry.

Assessment of Knowledge of Practice of Scientific Inquiry and Use of Appropriate Technology

In the laboratory section of courses, students maintain laboratory notebooks and write reports in which they assess the results of the experiments they conduct. In some courses, these experiments are focused on utilizing known procedures reported in a laboratory manual. In other courses, students transition from following a procedure to developing their own questions, strategies and experiments, with the intent of transforming the student into a scientist that is able to design, implement, and evaluate chemistry experiments. The Department of Chemistry

recognizes the critical role of modern instrumentation in understanding the relationships between concepts central to the physical sciences. Further, we observe that by using computer-driven instrumentation as tools for experimental evaluation, that student understanding of molecular level phenomena is enhanced and technological savvy is cultivated. The level of student understanding of the relationships between molecular structure and function and the consequences of those relationships in experimentation are gauged from student reports.

Assessment of Ability to Access and Produce New Information in Chemistry

Every spring the graduating seniors majoring in chemistry, biology, and biochemistry present their research projects to their peers and the faculty of the Departments of Chemistry and Biology at a senior thesis colloquium. The presentations are graded using a scoring rubric on the basis of presentation quality in establishing the importance of the project and clear statements of hypothesis, methods, results, and conclusions, among other criteria. The faculty then assembles as a committee to discuss their thoughts on the merit of each of the research presentations. The results of the committee decisions is provided directly to the students so that they may improve not only their presentation skills, but more importantly their general approach to scientific research.

Alignment with William Jewell College Education Department Conceptual Framework

The Departments of Chemistry and Education work together to ensure that the Chemistry Education program produces educators that are intentional, reflective, professional practitioners possessing a breadth and depth of content knowledge, an array of pedagogical skills and tools, strong interpersonal and communication skills, an ethical view of teaching as a moral activity, and the ability to research new knowledge. To achieve this end a faculty member from the Department of Chemistry regularly attends meeting of the Teacher Education Committee in order to be informed on programmatic goals and developments. The Chemistry faculty member is informed by the Education Department on the standards for science education outlined by the Missouri Department of Elementary and Secondary Education. These standards include, the DESE Grade Level Expectations, Missouri Curriculum Frameworks (Show-Me Standards), and

the MOSTEP performance standards. The specific standards which are met by the Department of Chemistry curriculum are listed below.

Grade Level Expectations Standards for Science

Strand 1: Matter and Energy

Strand 2: Force and Motion

Strand 7: Scientific Inquiry

Strand 8: Science, Technology, and Human Activity

Missouri Curriculum Frameworks (Show-Me Standards) for Curriculum Development for Science

Standard 1: Properties and Principles of Matter and Energy

Standard 2: Properties and Principles of Force and Motion

Standard 6: Composition and Structure of the Universe and the Motions of Objects within it

Standard 7: Processes of Scientific Inquiry (such as formulating and testing scientific hypotheses)

Standard 8: Impact of Science, Technology, and Human Activity on Resources and the Environment

MOSTEP Performance Standards

Quality Indicator 1.2.1: The preservice teacher understands the central concepts, tools of inquiry and structures of the discipline(s) within the context of a global society and creates learning experiences that make these aspects of subject matter meaningful for students.

Performance Indicator 1.2.1.1: The preservice teacher knows the subject(s) applicable to the area(s) of certification or endorsement (defined by *Subject Specific Competencies for Beginning Teachers in Missouri*)