

Product Name **MasteringChemistry**

Course Names **General Chemistry I and II**

Credit Hours **Four (each)**

**Key Results** Adding prelecture MasteringChemistry assignments facilitated increased student preparedness and engagement and enabled more time for interactive learning.

### Text

*Principles of Chemistry: A Molecular Approach*, 2e, Nivaldo J. Tro

### About the Course

General Chemistry I and II is a two-course sequence that covers the fundamental principles and laws of chemistry. Upon completion, students should be able to demonstrate an understanding of fundamental chemical laws and concepts as needed to pursue further study in chemistry and related professional fields. These are college transfer courses that include both lecture and lab components.

### Course Redesign

Our school serves many nontraditional students. The goal of the course redesign was to address the issue of underprepared students and to provide a resource for remediation outside the classroom.

We implemented the Supplemental model developed by the National Center for Academic Transformation. This model retains the basic structure of the traditional course and supplements lectures and textbooks with technology-based, out-of-class activities, or changes what goes on in the classroom by creating an active learning environment within a large, lecture hall setting.

From our experience in this departmentwide redesign, we identified the following best practices:

- Involve faculty as part of the planning team.
- Communicate redesign goals and keep faculty communication channels open.
- Set a timeline and include benchmarks to ensure the process continues to move forward.

- Provide students with start-up guidance, information for technical support, and an explanation of the value of Mastering.
- Reinforce the value of doing assignments before lecture.

### Implementation

Starting fall 2012, we implemented Mastering in Anatomy and Physiology I and II, General Biology I and II, General Chemistry I and II, and Microbiology. We added Mastering to Introductory Physics in spring 2013.

Instructors are required to assign prelecture homework, but have flexibility with regards to the assigned content. The majority of instructors give weekly Mastering assignments that include both tutorial and end-of-chapter questions.

Instructors report that the automated grading in Mastering makes it easier to assign graded homework and to understand where students need help. Beginning spring 2013, we added student learning outcomes to our Mastering homework to (1) facilitate a better understanding of student course and program performance and (2) inform decisions on course changes.

### Assessments

50 percent	Lecture exams
15 percent	Final exam
15 percent	MasteringChemistry homework
15 percent	Lab (participation, reports, practicals, exams)
5 percent	Other

*“I like the hints... sometimes I just need a nudge to get the right answer.”*

—Student

## Results and Data

I analyzed the course results for General Chemistry I and II and found the following:

- For the fall 2012 General Chemistry I class, 21 percent of students using MasteringChemistry earned a final course grade of A, compared to 17 percent and 0 percent the prior two semesters without MasteringChemistry (fall 2012,  $n=39$ ; spring 2012,  $n=16$ ; fall 2011,  $n=27$ ).
- For the fall 2012 General Chemistry I class, students who earned an A or B in the course averaged 95 percent on their MasteringChemistry homework.
- For the fall 2012 General Chemistry I class, students who earned a C, D, or F in the course averaged 60 percent on their MasteringChemistry homework.
- For the spring 2013 General Chemistry II class using MasteringChemistry, 65 percent of the students earned an A or B in the course, compared to 50 percent the prior semester without MasteringChemistry (spring 2013,  $n=20$ ; spring 2011,  $n=22$ ).

## The Student Experience

Students like the opportunity to walk through content prior to lecture, are more engaged in learning, and are more prepared for class. Students also feel that Mastering helped them understand the course material.

Student comments include:

- “I liked the extra attempts it allows to complete a question as well as the hints section. If you understand the problem but need assistance with one step, the hints option breaks down the process of the step you may not understand.”
- “What I liked about Mastering was that I could look at what information I needed to before any and all tests. I could learn at my own pace.”

## Conclusion

We redesigned our science courses adding Mastering to provide students with a tool to help them prepare for class and get help when they need it the most. Prelecture homework assignments engage students in course content outside of class and better prepare them for lecture. This in turn enables us to increase the amount of interactive learning and critical thinking activities during class.

*Submitted by Louis McIntyre, Science Department Chair  
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