**Affordable Learning Georgia Affordable Materials Grants  
Continuous Improvement Grants Final Report**

*(or Mini-Grants, for R17 and earlier)*

# General Information

Date: 01/19/2025

Grant Round: Round 25

Grant Number: M279

Institution Name(s): University of Georgia

Team Members (Name, Title, Department, Institutions if different, and email address for each): Matthew Seivert, Lecturer, Department of Chemistry, [mseivert@uga.edu](mailto:mseivert@uga.edu); Eman Abdelrahman, Lecturer, Department of Chemistry, [eman.abdelrahman@uga.edu](mailto:eman.abdelrahman@uga.edu)

Project Lead: Matthew Seivert

Course Name(s) and Course Numbers: General Chemistry I, CHEM1211

Final Semester of Project: Fall 2024

***If applicable to your project:***

Average Number of Students Per Course Section: approximately 110 (in Fall 2024)

Number of Course Sections Affected by Implementation of Revised Resources: 10 (in Fall 2024)

Total Number of Students Affected by Implementation of Revised Resources: approximately 1100 (in Fall 2024)

# Project Narrative

*Describe the course of your revision or ancillary creation project, including*

* *A summary of your project’s purpose, plan, and timeline.*
* *The original works which were revised or added to, with links. For example, if you revised an open textbook, give the title, author, and link.*
* *A narrative description of how the project’s plan was carried out.*
* *Lessons learned, including anything you would do differently next time.*

The purpose of this project was to complete a major overhaul of ancillary materials used in General Chemistry I (CHEM1211) recitation sessions. Currently, here at the University of Georgia (UGA), all of our CHEM1211 classes have a once weekly mandatory recitation session for students to work on recitation materials with the assistance of instructors and undergraduate Chemistry Learning Assistants (CLAs). Since Fall 2020, we have found the implementation of recitation sessions to be very beneficial to student learning and have prioritized investing as many resources as possible to these sessions to maximize their benefit. At the center of these resources include the recitation materials that students would work on during the allotted time period which was supported by this grant.

This project began by collecting responses from students and CLAs at the end of the Spring 2024 semester (April 30, 2024 – May 7, 2024) in which we asked for feedback regarding recitation materials (e.g. what was beneficial, what could be improved, etc.). In addition, faculty feedback was also noted throughout the entire Spring 2024 semester primarily in course relevant meetings. With significant feedback from multiple parties, our team spent July (July 1, 2024 – July 31, 2024) revamping these recitation materials. We started by creating a new set of instructions that would be used in both CHEM1211 and CHEM1212, in addition to making sure that the way we revamped these materials would be done consistently. All of these materials were written in a way that could be graded using the interface Gradescope, while also including a variety of formats including multiple choice, select all that apply, and short fill in the blank type questions. The format of these materials was also written to mimic the format of the exams so students would know what to expect in these assessments. Beyond formatting, the chemistry department also agreed to change the General Chemistry textbook from “Chemistry” written by Zumdahl to “Chemistry & Chemical Reactivity” written by Kotz. The selection of a new book only slightly changed the content covered, but it did significantly change the order in which we would cover content, which contributed to major revisions in our recitation materials.

A significant component of revamping these materials included integrating new questions and editing current questions which required a significant amount of revision. One of our team’s main concerns was keeping recitation worksheets to a length that could be completed by students in 50 minutes (with help from fellow classmates, CLAs, and instructors). It should be noted that every week graded materials were opened on Mondays at 8:00 AM and were due on Saturdays at 9:00 AM so students could work on this assessment throughout the week. Students were still required to attend their 50 minute weekly recitation session, and we wanted the length to fit this time frame. Our solutions to the time constraints included three different approaches:

1. Utilizing an “Extra Practice Questions” section at the end of graded recitation materials and adding questions here that were optional to complete and that would not be graded
2. Creating optional worksheets that were also optional and not graded
3. Adding questions to our Exam Review worksheets which were also optional and not graded

The idea of creating optional worksheets (detailed in #2 above) was a new idea piloted in this project. In addition to providing extra practice, the idea to create these particular worksheets was also motivated by our recitation schedule. More specifically, our recitation materials covered the previous week’s content, but on exam weeks, students were previously not given a dedicated worksheet for the content covered the week before. Instead, students primarily received practice for this particular content on the Exam Review worksheets. To maximize the extra practice given, we created these additional optional worksheets to cover content discussed the week before exams, while also providing extra practice over this content in the Exam Review materials.

Since all three approaches involved adding questions to worksheets (or sections of worksheets) that were not graded, it provided us with a great deal of versatility. For example, there was no upper limit to the number of questions we wanted to add, and it allowed us to provide students extra practice questions on difficult topics if they desired the additional help. Notably, there is less incentive to complete questions that are not graded, but we wanted to give our students the accessibility of the extra practice regardless.

We finished the overhaul of these materials in July and we were able to integrate them in the CHEM1211 curriculum throughout the entirety of the Fall semester (August 14, 2024 – December 3, 2024). Furthermore, these materials were also integrated into the Honor’s version of CHEM1211 (Advanced General Chemistry I Honors, CHEM1311H). This was the first semester this particular class had a recitation session, and since the curriculum was nearly identical, we were able to expand the reach of these overhauled materials.

After the semester was over (December 4, 2024 – December 11, 2024), we sent a survey to our students and CLAs to collect feedback on these materials. Overall, student and CLA feedback was overwhelmingly positive, and we found that the majority of students in both CHEM1211 and CHEM1311H found these materials to be beneficial. Indeed, in CHEM1211, 882 students (out of 928 students who took the survey) found these materials to be beneficial (95.0 %). In CHEM1311H, 51 students (out of 53 students who took the survey) found these materials to be beneficial (96.2 %).

# Materials Description

*Describe all the materials you have created or revised as part of this project. These descriptions may be used in the* [OpenALG](https://alg.manifoldapp.org/) *repository description field. Include the* [*open license your materials will be shared under*](https://creativecommons.org/share-your-work/)*—for most materials, this will be an Attribution 4.0 License (CC BY) as required in the Grants Request for Proposals.*

We are submitting a total of twenty two worksheets that have been created or revamped as a part of this project, in addition to detailed annotated keys for each of these worksheets. The general breakdown of these materials include:

* One worksheet meant to introduce students to the format of our worksheets and submitting them to Gradescope (Recitation Worksheet 0)
* Nine worksheets that covered content from the previous week’s lecture (Recitation Worksheets 1, 2, 4, 5, 6, 8, 9, 11, and 12)
* Four exam review worksheets that covered all the content students were expected to know on their four midterm exams (Recitation Worksheets 3, 7, 10, and 13)
* Eight worksheets for additional practice (each titled “Extra Practice Recitation Worksheet”, followed by the specific section coverage) that did not have a dedicated recitation week

All of these materials are being made accessible via an Attribution 4.0 License (CC BY).

# Materials Links

*If you are hosting your materials in places other than OpenALG, please provide these links in this section. Otherwise, leave blank. Note: we cannot access D2L or Canvas links.*

# Future Plans

* *Describe any planned or actual papers, presentations, publications, or other professional activities that you expect to produce that reflect your work on this project.*
* *Describe any plans to revise or add to these materials in the future.*

In the future, we fully expect to continue to make revisions, add questions, and find ways to further improve these materials. Instructor feedback on each recitation worksheet is always requested before distributing these worksheets to students throughout each semester which often leads to numerous recommendations. This includes a range of feedback including requesting minor edits such as editing a question for clarity, asking for a specific type of problem to be integrated that they have noticed students struggling with, etc. Furthermore, we plan to continue to send surveys to our students and CLAs at the end of each semester to collect feedback which will be considered in future revision plans.