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

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

# General Information

Date: 01/19/25

Grant Round: 24

Grant Number: #M254

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, University of Georgia, mseivert@uga.edu

Project Lead: Eman Abdelrahman

Course Name(s) and Course Numbers: General Chemistry II (CHEM1212)

Final Semester of Project: Fall 2024

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

Average Number of Students Per Course Section: ~160 students

Number of Course Sections Affected by Implementation of Revised Resources: 6 sections

Total Number of Students Affected by Implementation of Revised Resources: 761 students

# 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 original plan was to revise and update the CHEM 1212 “General Chemistry II” recitation worksheets to match the CHEM 1211 “General Chemistry I” recitation worksheets. At the University of Georgia, we use a “team teaching model” in which the instructors use the same textbook, syllabus, homework assignments, and recitation worksheets. In the past, each instructor in the team used to take turns writing the recitation worksheets in both and as a result there was an inconsistency in the format, length, and level difficulty of the questions across the board. In Fall 2022 when I accepted a faculty position at the Department of Chemistry at UGA, I was assigned to write the recitation worksheets for CHEM 1212 and although there was a pattern of consistency throughout the recitation worksheets, they did not match the worksheets for CHEM 1211.

Once the grant was acquired, the plan was to reformat the recitation worksheets in General Chemistry I and II in collaboration with Seivert. I was working on the CHEM 1212 and Seivert was working on the CHEM 1211 recitations. The recitation worksheets will include (as it did the past) a cover page with all the instructions and in Fall 2024 we have switched to a new textbook (Chemistry & Chemical Reactivity by John C. Kotz, Paul M. Treichel, John R. Townsend, David Treichel) 11th Edition) including the title of the textbook. The questions on the recitations were to be formatted to include past exam questions written by various instructors in their respective courses. We also planned to include extra practice questions at the end of each worksheet, and supplemental recitations which both are not graded.

The timeline for the plan included: **January 1, 2024 – May 1, 2024**: the recitation material will be created, modified, and revised. The recitations will be implemented in Spring 2024 and feedback from instructors and CLAs will be collected, **April 1, 2024 – May 1, 2024**: a survey will be distributed to CHEM1212 students and Chemistry Learning Assistants (CLAs) to collect feedback, **June 1, 2024 – June 30, 2024**: using feedback collected from faculty, CLAs, and students, recitation session worksheet will be revised to maximize their use in recitation sessions, **August 1, 2024 – December 1, 2024**: the new recitation worksheets will be implemented in CHEM 1212, **November 1, 2024 – December 1, 2024**: a final survey will be distributed to CHEM 1212 students and CLAs to collect feedback.

The original recitations contained a cover page with instructions on how students format their answers and the actual worksheet to the Gradescope platform. The title of each recitation worksheet included the recitation number, chapters covered in each section for guidance, due date for submission and all are formatted in a fillable PDF format. The CHEM 1212 recitation questions were a mix of math based and conceptual problems in the range of 15-19 questions per worksheet. Each worksheet was accompanied by a handwritten annotated answer key on a iPad Pro using Notability application. Recitations labeled exam reviews had an answers only key besides the annotated answer key. The link to the original recitations can be found here: [ALG Round 24 (CHEM 1212 Recitation Worksheets)](https://outlookuga-my.sharepoint.com/:f:/r/personal/ema88805_uga_edu/Documents/ALG%20Round%2024%20(CHEM%201212%20Recitation%20Worksheets)?csf=1&web=1&e=LIfXTn).

The recitation worksheets were reformatted to match, font, font size, spacing, and accessibility with the CHEM 1212 recitations. I collaborated with Seivert to try and extend the length of the recitation worksheet and keep them in the range of 25-30 questions (the recitations labeled exam review were beyond the range mentioned as more materials were covered) and we both added extra practice questions at the end of each recitation worksheet. The recitations were implemented in Fall 2024 students (~761 students). An end of year class survey was administered to the students with specific questions about how the recitation worksheets impacted their performance in the course. I also wanted to add that the Chemistry Learning Assistants Program where CLAs help students with the worksheet was an integral part of the success of the active learning recitation initiative we pursue at UGA.

This was a valuable and enriching experience which taught me how to better write and choose questions for recitation worksheet. Chemistry at the University of Georgia is held at a high stand and to be able to the meet this standard students indeed need additional resources to apply the knowledge which can be quite challenging. Writing concise and rigorous problems is not an easy task but through this grant and improving the recitations our student satisfaction rate in Fall 2024 was **96%** vs. **Spring 2023** they were **85.8%** in CHEM 1212. Below are some of the student verbatim quotes from Fall 2024 class survey:

“I mainly used them to study because they provided the best examples”

“I found that the questions aligned well with the exams and the material I needed to know”

“Some problems were difficult and prepared me for the exams”

“I like the repetition of the problems. I think the best way to learn the material is to solve lots of problems”

“It asked really good question”

In the future I would like to add a few recitations containing case studies which in my opinion would fit very elegantly in CHEM 1212 since it is an application-based chemistry course.

# 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.*

CHEM 1212 recitation worksheets including exam reviews and supplemental extra practice including questions written by myself and UGA instructors. This includes handwritten annotated answer keys. You can find the link to the license here: [ALG Round 24 - CHEM 1212 Recitation Worksheets](https://outlookuga-my.sharepoint.com/:f:/r/personal/ema88805_uga_edu/Documents/ALG%20Round%2024%20(CHEM%201212%20Recitation%20Worksheets)?csf=1&web=1&e=DYfRHe)© 2024 is licensed under [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/?ref=chooser-v1)

# 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.*

We have been to the Biennial Conference on Chemical Education (BBCE) this past summer and I am planning to present a separate a lecture or poster in the upcoming BCCE conference or other related chemical education conferences.