Affordable Materials Grants, Round 19:

Continuous Improvement Grants

(Spring 2021 -Spring 2022)

Proposal Form and Narrative

# **Notes**

· The proposal form and narrative .docx file is for offline drafting and for our review processes. Submitters must use the online Google Form for proposal submission, including uploading this document.

· The only way to submit the official proposal is through the Google Form. The link to the online application is on the [Round 19 RFP Page](https://www.affordablelearninggeorgia.org/about/rfp_r19).

· The italic text provided below is meant for clarifications and can be deleted.

The Round 18 Kickoff will include an asynchronous training module, required for all team members to complete, followed by the synchronous Kickoff Meeting on March 26, 2021 from 1pm-4pm. At least two team members from each awarded team (unless the award is for one individual) are required to attend the synchronous Kickoff Meeting.

# **Applicant and Team Information**

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| **Requested information** | **Answer** |
| **Institution** | University of West Georgia |
| **Applicant name** | Anne Gaquere Parker |
| **Applicant email** | agaquere@westga.edu |
| **Applicant position/title** | Professor of Chemistry |
| **Submitter name** | Same |
| **Submitter email** |  |
| **Submitter position/title** |  |

Please provide the first/last names and email addresses of all team members within the proposed project. Include the applicant (Project Lead) in this list. Do not include prefixes or suffixes such as Ms., Dr., Ph.D., etc.

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| **Team member** | **Name** | **Email address** |
| **Team member 1** | Oliver Duah | oduah@westga.edu |
| **Team member 2** | Jubilee Ojibo | jojibo1@my.westga.edu |

If you have any more team members to add, please enter their names and email addresses in the text box below.

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**Project Information**

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| **Requested information** | **Answer** |
| **Type of Project** | *Creation of ancillaries for existing OER courses* |
| **Requested Amount of Funding**  *$10,000 maximum total award per grant* | *$5,000* |
| **Course Titles and Course Numbers** | Survey of Chemistry I and II (year-long sequence): CHEM 1151 and CHEM 1152, and Medication Mathematics: NURS 3210 |
| **Final Semester of Project** | *Spring 2022* |
| **Currently Existing Resource(s) to be Revised/Ancillaries Created**  *Please provide a title and web address (URL) to each of the currently existing resources that you are revising, creating new ancillary materials for, or replacing. If replacing, please include a title and web address (URL) to the new OER as well.* | CHEM1151:  [UWG Low-Cost/No-Cost Courses - Open Education Resources - LibGuides at University of West Georgia (westga.edu)](https://libguides.westga.edu/OER/NoCostCourses)  CHEM1152:  <https://chem.libretexts.org/Courses/University_of_West_Georgia/CHEMISTRY_1152_UWG> |

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# **Project Goals**

At the University of West Georgia (UWG), pre-allied health majors (pre-nursing) have the choice of taking a year-long introductory science course either in biology or chemistry. The chemistry sequence is taught by the PI of this proposed work, Anne Gaquere-Parker. Once they have successfully completed this requirement, they move on to take biology courses before applying to the nursing program. Chemistry courses introduce students to the basic principles underlying pharmacology and medication calculation, while biology provides students with a foundation for pathophysiology. Students who choose to take the introductory biology sequence are thus never exposed to any chemistry and calculations involving medication. This may be problematic as students enrolled in the nursing program must be very familiar with pharmacology and medical calculations. To resolve this issue, all students accepted in the nursing program have to take a one-credit-hour nursing course named “Medication Mathematics”, taught by the co-PI of the proposed project, Oliver Duah. The faculty member has observed that students who take the chemistry sequence excel in this medication calculation course. In order to level the playing field and be equitable to all students, the team proposes to develop course materials to be used in the chemistry sequence as well as in the medication mathematics course. In addition to resolving the issue of inequity, this project, if funded, will make the chemistry course materials even more relevant to pre-nursing students by establishing links between chemistry, medication mathematics, and nursing, as well as increasing the students' confidence in their skills to calculate medication doses competently.

Over the past two years, to attract students and lower the cost of the chemistry sequence (**all sections** of Survey of Chemistry I and II, CHEM1151 and CHEM1152), the PI was successful in obtaining funds through the ALG grant program. A textbook transformation grant (November 2018, $20,800) to replace the current textbook with an open-access textbook for CHEM1151 was obtained, followed by two continuous grants to continue this work and implement it in CHEM 1152. One continuous grant was funded in May 2020, $4,800, for CHEM 1151 and completed in December 2020, and a second one designed for CHEM 1152 was funded in October 2020, $5,000 and is still ongoing. With these funds, two heavily edited open-access textbooks have been created with accompanying study guides for both CHEM1151 and 1152, as well as a series of medically relevant, solved problems for CHEM1151. Currently, in CHEM1152, students are generating and sharing with the class renewable assignments. All course materials are currently being used exactly as planned in the previously funded projects. Lately, it has come to our attention that previously funded ALG projects may be discontinued because the instructor was replaced by a different person who may not have access to the previous work. Although the PI is expected to teach this course for many more years as she has for the past 15 years, we propose to establish a unique online repository that would host everything ever created through this grant program for CHEM1151 and 1152 at UWG, including materials that need to be password-protected. The existing Libguide does not have password-protected parts, but we will add this feature whenever necessary.

The team wants to develop enough materials to be widely shared to ensure long-term sustainability of this endeavor and help others who wish to do the same at their institution nationwide.

This new project aims to add more relevant content in all the sections of both CHEM1151, CHEM 1152, and NURS 3210 with the following goals:

Goal 1: Create case studies with medical calculations relevant to the nursing field to be used in CHEM1151 (Fall 2021);

Goal 2: Create case studies with biochemical examples relevant to the nursing field to be used in CHEM1152 (Spring 2022);

Goal 3: Create a repository of all the newly created case studies (Goals 1 and 2) to make them available to all students entering the nursing program (NURS 3210);

Goal 4: Increase student engagement by including renewable assignments into the course design in CHEM1151 as it is currently and successfully implemented in CHEM1152;

Goal 5: Create a differentiated repository for all the materials previously and currently created, with parts accessible by the general public and parts that are password protected.

It is important to note here CHEM1152 is the object of a current continuous improvement and that the work is being completed as we write this new proposal. Students enrolled in the course are currently creating renewable assessments. Except for the final report, the parts assigned to the faculty members have been completed and successfully implemented already. Based on this encouraging work, we are requesting funds to expand the work further as described in this proposal.

# **Action Plan**

The team has a unique composition that gives it a special perspective on how to increase pre-nursing student success. The team is composed of two faculty members: one from chemistry, Dr. Gaquere-Parker, PI, and sole instructor for all sections of this chemistry sequence and one from the Tanner School of Nursing, professor Duah, co-PI, who has experience teaching the pharmacology course and is currently teaching the medication Mathematics for drug calculations. Professor Duah took CHEM 1151 and 1152 with the PI and served as a chemistry workshop leader and a peer-led instructional mentoring program for both the 1151 and 1152 courses for three years. In addition, an undergraduate pre-nursing student, Jubilee Ojibo, who took this sequence of courses last year, who is the current supplemental instruction leader for the chemistry sequence, and who has been hired to help with the currently funded project, will continue in this role if the proposed project is funded.

The team has the full and enthusiastic support of the Dean for the School of Nursing, Dean Schuessler, who has seen the need to make the transition from prerequisite courses to the nursing programmatic courses seamless, and who can see how this project directly addresses a challenge in the prelicensure BSN curriculum.

As mentioned earlier, transformation of all sections of the year-long sequence of survey of chemistry (CHEM1151 and CHEM1152) was funded through the ALG program. The encouraging results and positive feedback from the students are the impetus behind the development of this new project.

The challenge for nursing majors studying chemistry is the lack of a clear link of how they will apply such knowledge in the field of nursing. However, chemistry provides the foundation for chemical formulations and calculations, which are essential skills for nursing practice. Furthermore, there is a strong link between chemical concentrations and medication doses. Thus, a strong foundation in chemistry and its applications in nursing will increase learner optimism for succeeding in the medication mathematics course and, consequently, in the nursing practice courses. In addition and as already mentioned, creating more resources for students will help level the playing field for students who chose the biology sequence, thus increasing equity to the program.

Plan of action for goals 1 and 2: Together, the team will create about 10 case studies that will have multiple parts that span the entire chemistry sequence. Learning and remembering is an active act that requires the students to recall facts periodically; therefore, by having stories that span several chapters over two semesters, the instructor will have the students recall important concepts, a practice similar to interleaving. Interleaving involves retrieval of information, which cements knowledge and produces better long-term results. Very few students enrolled in CHEM 1152 took CHEM 1151 at another institution (one or two a year), yet they will also benefit from this unique retrieval approach, leveling the playing field for them too.

An example of a topic that will be developed further, if funded, is briefly shown below. The team will also ensure that the topics relate to each and every chapter in the chemistry sequence, as well as a diverse type of examples not only focused on medication overdose.

**Aspirin Case Study:** Case Prompt: In 2005, reporter Steve Bauer wrote a story about a Champaign man who died accidentally from aspirin poisoning in “The News-Gazette.” Mr. L. F. was a 50-year-old man who was using aspirin to manage his pain from arthritis. Forensic pathology revealed that he had a toxic salicylate level of 880 nanograms per milliliter in his blood serum. What happened?

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| Guiding questions | Relevant course and topic |
| The recommended dosage for aspirin for an adult is 325-650 mg every 4 hours for a maximum of 4 g per day. If the prescribing provider asked the patient to take 650 mg of aspirin every 4 hours for an entire day, would this dose be within the safe dose limits? | CHEM 1151:  Chapter 1: Measurements  NURS 3210  Module 3: Dosage Calculations (Tablets) |
| The serum therapeutic range of aspirin is 15 to 30 mg/dL. Mild toxicity occurs at serum levels greater than 30 mg/dL with severe toxicity seen when levels are greater than 50 mg/dL. Calculate how many moles and molecules of aspirin are present in each of these concentrations. | CHEM 1151:  Chapter 6: Chemical reactions and quantities  NURS 3210:  Module 5: Safe and Therapeutic Doses |
| The treatment of salicylate poisoning includes the use of activated charcoal, which is highly porous. Explain the phenomenon. | CHEM 1151:  Chapter 9: Reaction rates  NURS 3210:  Module1: Medication Administration and Safety  NURS 3210: Module 4: Therapeutic Action and Adverse Effects of Medications |
| Aspirin poisoning leads to a condition called metabolic acidosis. Sodium bicarbonate is a buffer that may prevent this. Show how sodium bicarbonate acts as a buffer in blood. | CHEM 1151:  Chapter 10: Acids, bases, buffers |
| What is the chemical formula of aspirin? Identify the functional groups. | CHEM 1152:  Chapter 11: Introduction to organic chemistry |
| What type of compound is aspirin? How is it synthesized? | CHEM 1152  Chapter 16: Carboxylic acids and esters |
| How does aspirin work? | CHEM1152  Chapter 20: Enzymes |
| What are the pathophysiologic effects of aspirin poisoning? List at least 5 effects. | CHEM1152  Chapter 22: Metabolism  NURS 3210:  Module 1: Medication Administration and Safety |

Case scenarios have been developed for teaching and learning in Medication Mathematics courses such as those by the National Center for Case Study Teaching in Science; however, these cases, although a good starting point from a conceptual point of view, are not interdisciplinary. They are also not necessarily at the level expected for nursing school, not applied enough, and are expensive to access by students and faculty. Therefore, we propose to create interdisciplinary cases that integrate topics from Chemistry and Nursing, thus, helping learners recognize the essence and the applicability of what they are learning.

The team has identified six major tasks to accomplish the five goals stated earlier, as follows:

1. Identifying stories for the case studies, Professor Duah, ~ 20 hours
2. Create 10 case studies with questions and solutions, Dr. A. Gaquere-Parker, Professor O.Duah, ~60 hours each, J. Ojibo ~ 50 hours
3. Organizing the creation of renewable assignments as both courses are being taught, Dr. A. Gaquere-Parker, ~ 7 hours, J. Ojibo ~ 15 hours
4. Creating and organizing the two repositories ensuring accessibility and discoverability, Dr. A. Gaquere-Parker, ~ 3 hours, J. Ojibo ~ 15 hours
5. Assessment, Dr. A. Gaquere-Parker, ~ 20 hours, Professor O.Duah, J. Ojibo ~ 10 hours each
6. Dissemination, Dr. A. Gaquere-Parker, Professor O.Duah, J. Ojibo, ~ 10 hours each

Explanation for task 1: Case scenarios are useful in providing examples of life applications to aid student learning. Case scenarios can either be synthesized from real-life situations as in news media reports or can be developed hypothetically to stimulate problem solving. We will identify real stories such as cases of drug overdoses, chemical accidents, and patient case reports from the literature and news media to form the basis of our scenarios. We will also develop hypothetical scenarios using evidence from published works.

Explanation for task 2: Create 10 case scenarios with questions and solutions anchored in allied health disciplines, making the course content relevant to the student population. Several solved problems with a health-related context as well as questions to help with the students’ conceptual understanding will be created. It is very important to offer students ways to engage deeply with the course material and the use of active learning assignments will accomplish this important goal.

Explanation for task 3: This project also allows our team the opportunity to build renewable assignments into the course design. Having students actively contribute as knowledge creators instead of operating as passive recipients of information will add another dimension to the learning experience. Research shows that students who participate in this high-impact practice are more likely to be engaged in the class and experience a sense of agency in their learning process. We will take advantage of open pedagogical practices while strengthening the effectiveness of open course materials by encouraging students to become collaborators.

Explanation for task 4: The team will create a Libguide that has several parts, that include the Libguides already created for the past projects and that should be visible to anyone, and add a part that is password-protected that can be shared with any faculty interested in teaching the sequence.

Explanation for task 5: Assessment: For this continuous improvement grant, the directly accessible quantitative data will include: a) Course DFW rates, b) student scores on the final exam written by the American Chemical Society (ACS), c) course C rates, and d) the percentage of students directly continuing to Microbiology the following course for pre-allied health majors and that requires a B or higher in chemistry.

Explanation for task 6: Dissemination: It is anticipated that this project, if funded, will lead to several presentations at statewide STEM and STEM education conferences, including the Innovations in Pedagogy conference held annually on the University of West Georgia campus in May, as well as the Annual Pedagogy Conference in Athens. The work will also be shared as a public and searchable Libguide for extensive dissemination, as we have created for CHEM 1151 and CHEM 1152. The team is familiar with the IRB process, an IRB approval was already obtained for the previous iterations of the grant, and a new IRB application will be submitted to continue this work and its dissemination if this project is funded. The team believes that enough data will be generated through this work to prepare and submit a manuscript for peer-review in a nursing education journal such as the Journal of Nursing Education or Nurse Education Today.

The PI of this proposal, Dr. Gaquere-Parker, has been the lead instructor for the first semester of this sequence for 15 years and started teaching the second part of this course in spring 2020, after a short hiatus. She is slated to teach the full sequence annually from now on. Therefore, she will be responsible for updating the course materials as needed after the grant period has ended. To the best of our knowledge, this would be the first example of an open access yearlong chemistry sequence for pre-allied health majors in the University System of Georgia, a chemistry sequence that is taken by hundreds of students across Georgia every year, sharing the same course content all over the State thanks to the repository created in this project.

Finally, if funded, this project will affect the number of qualified applicants for nursing school and the overall number of graduates in this field, addressing the shortage of trained professionals in the nursing field. This broader impact of this project for the local community and the State of Georgia is therefore quite significant.

# **Timeline**

- Summer 2021:

* The team members will develop the case studies to be implemented in CHEM 1151, CHEM 1152, and NURS 3120
* Creation of repository for faculty materials
* Creation of repository for nursing students

- Fall 2021:

* Implementation in 1151 and NURS 3120: Use of all created materials
* Creation of course material by students (renewable assessments)
* Survey of students about case studies and renewable assessments
* Add newly created materials to the two repositories

- Spring 2022:

* Implementation in 1152 and NURS 3120: Use of all created materials
* Creation of course material by students (renewable assessments)
* Survey of students about case studies and renewable assessments
* Add newly created materials to the two repositories
* Data analysis from students surveys
* Combine data from course grade distribution and scores on the ACS final throughout the years to monitor the effect of the multiple grants
* Present the work done at Innovations in Pedagogy conference on campus (the PI has presented multiple times her work at this annual conference that takes place annually in May)
* Write and submit the final report
* Submit a manuscript for peer-review in a nursing education journal such as the Journal of Nursing Education or Nurse Education Today.

# **Budget**

Request: $5,000

- $4,000: The two faculty members, Anne Gaquere Parker and Oliver Duah, will receive $2,000 each for their work on the grant as described in this proposal.

- The undergraduate student will receive $1,000. We expect the student to work 100 hours total.

# **Creative Commons Terms**

*I understand that any new materials or revisions created with Affordable Learning Georgia funding will, by default, be made available to the public under a Creative Commons Attribution License (CC-BY), with exceptions for modifications of pre-existing resources with a more restrictive license.*

# **Accessibility Terms**

*I understand that any new materials or revisions created with Affordable Learning Georgia funding must be developed in compliance with the specific accessibility standards defined in the* [*Request for Proposals*](https://www.affordablelearninggeorgia.org/about/rfp_r18)*.*

# **Letter of Support**

*The Department Chair from the corresponding project, or the Department Chair’s direct report such as the Dean or Provost, must provide a signed Letter of Support for the project. This letter should acknowledge the following:*

* *The department will provide support for fund disbursement in correspondence with the Grants/Business Office.*
* *The department approves of the work on the proposal by the applicant(s).*
* *The department acknowledges the sustainability of these affordable resources after the grant work is complete.*

*In the case of multi-institutional affiliations, all participants’ institutions must provide a letter of support.*

*Please provide the name and title of the department chair (or other administrator) who provided you with the Letter of Support.*

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| **Dean Pauline Gagnon** |

# **Grants or Business Office Letter of Acknowledgment**

*Institutional Grants/Business Offices will be responsible for fund disbursement, often in correspondence with the Department Chair, including expense and travel reimbursement. Applicants will need to provide a short Letter of Acknowledgment stating that the Grants/Business Office knows about the applicant’s intent to apply for an Affordable Materials Grant. Either the Department Chair or the Project Lead can work with the Grants/Business Office to get this signed letter.*

*In the case of multi-institutional affiliations, all participants’ institutions must provide a letter of acknowledgment.*

*Please provide the name and title of the grants or business office representative who provided you with the Letter of Acknowledgment.*

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| ***Charla Campbell, Assistant Director***  ***on behalf of* Associate Vice President for Research, Dr. Denise Overfield** |