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Application Summary

Competition Details

Competition Title:	Textbook Transformation Grants, Round Fourteen (2019-2020)
Category:	University System of Georgia
Award Cycle:	Round 14
Submission Deadline:	04/09/2019 at 11:59 PM

Application Information

Submitted By:	Suzanne Ellenberger
Application ID:	3369
Application Title:	453
Date Submitted:	04/24/2019 at 2:32 PM

Personal Details

Institution Name(s):	University of Georgia
Applicant First Name:	Suzanne
Applicant Last Name:	Ellenberger
Applicant Email Address:	suzanne.ellenberger@uga.edu
Applicant Phone Number:	706-542- 6225
Primary Appointment Title:	Director of Freshman Chemistry and Lecturer
Submitter First Name:	
Submitter Last Name:	
Submitter Email Address:	
Submitter Phone Number:	
Submitter Title:	

Application Details

Proposal Title

453

Final Semester of Project

Summer 2020

Requested Amount of Funding

\$30,000

Type of Grant

Gateways to Completion

Course Title(s)

Freshman Chemistry I and Freshman Chemistry II

Course Number(s)

CHEM 1211 and CHEM 1212

Team Member 1 Name

Suzanne Ellenberger

Team Member 1 Email

suzanne.ellenberger@uga.edu

Team Member 2 Name

Wayne Suggs

Team Member 2 Email

dwsuggs@uga.edu

Team Member 3 Name

Sara Blankenship

Team Member 3 Email

sara.blankenship@uga.edu

Team Member 4 Name

Wenjian (Vince) Du

Team Member 4 Email

wenjian.du@uga.edu

Additional Team Members (Name and email address for each)

Ana West ana.west@uga.edu

Rupa Gokal rugokal@uga.edu

Joel Caughran caughran@uga.edu

Douglas Jackson dmjackson@uga.edu

Sponsor Name

Dr. Rahul Shrivastav

Sponsor Title

Vice President of Instruction

Sponsor Department

Office of Instruction

Original Required Commercial Materials (title, author, price)

Ellenberger, Suzanne - #3369

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MindTap General Chemistry by Vining (textbook and pre-lecture homework assignments), Cengage, \$60 per semester

WebAssign (weekly progress checks and exams) \$28 per semester

Turning Technologies (student response system) \$50 for five years or \$12 per semester

Average Number of Students per Course Section Affected by Project in One Academic Year

280

Average Number of Sections Affected by Project in One Academic Year

24

Total Number of Students Affected by Project in One Academic Year

6,000

Average Number of Students Affected per Summer Semester

400

Average Number of Students Affected per Fall Semester

3,000

Average Number of Students Affected per Spring Semester

2,600

Original Total Cost per Student

100

Post-Project Cost per Student

\$0-\$40 (depending on if Turning or WebAssign already purchased)

Post-Project Savings per Student

\$60-\$100

Projected Total Annual Student Savings per Academic Year

\$400,000

Using OpenStax Textbook?

Yes

Project Goals

NOTE FROM ADMINISTRATORS: This project is both a G2C and Scaling Up OER project. Applicants were unable to select both.

The overall goal of the proposed project is to continue the efforts initiated last year, which were partially funded by an ALG grant awarded in 2018, to develop and deploy new open-source, low cost interactive course work materials to all sections of the high-enrollment G2C core curriculum course Freshman Chemistry I and II (CHEM 1211 and 1212). Upon development and deployment of these materials, the team's goal is to achieve significant cost savings for students with an overall impact of \$400,000 per year.

The textbook that will be created will be a modification of OpenStax "Atoms First" in an interactive format which will include embedded homework questions and short video explanations of difficult conceptual topics. This will substantially enhance the flipped classroom approach in which these courses are taught wherein students are expected to come to class with a basic understanding of the content which is supported by answering pre-lecture questions. From a pedagogical perspective, the team seeks to engage students with more complex problems to develop their conceptual understanding of the material and see the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, biology, physics and other disciplines to a wide variety of chemical problems. This restructuring of the courses allows faculty more creativity in what and how they teach and greater levels of student centered active learning.

The resulting outcomes on understanding Freshman Chemistry will be directly measured and assessed to ensure ability of the new materials to improve learning outcomes that emphasize depth rather than breadth and include mathematical and conceptual thinking, constructing an explanation, and, developing models to predict and explain chemical phenomena. This will ensure that learning objectives focus on scientific practices rather than primarily on content and that these practices are both taught and assessed.

Statement of Transformation

Freshman Chemistry I and II (CHEM 1211 and 1212) at the University of Georgia are Core Curriculum and Gateways to Completion courses that are required for all STEM discipline majors. These courses have a total enrollment of approximately 6,000 students per academic year and are taught in the fall, spring and summer semesters. The goal of these courses is to introduce a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective and provide students with the skills required to succeed in subsequent interdisciplinary courses.

At UGA, CHEM 1211 and 1212 are taught in a flipped classroom approach that the team believes is superior to a conventional lecture pedagogy. A mandatory, weekly one-hour study session led by Peer Learning Assistants is also employed in the redesign of these courses. Use of an OpenStax textbook, "Atoms First", was implemented in the fall 2018 semester and is currently being used in its unedited, original form. Benefits seen from the preliminary changes in two semesters of use include a decrease in the withdrawal rate of CHEM 1211 students from approximately 25% to 19% in the fall and 13% in the current spring term.

The first course improvement that will be made will be to modify and deploy the OpenStax textbook "Atoms First". The order in which the topics are presented will be reorganized for a better flow of ideas and topics will be introduced multiple times for continuity and connectedness. Often students perceive the topics presented in a general chemistry course to be discrete, independent topics and fail to see their interconnectedness. Our course redesign has attempted to correct this by introducing topics several times in early chapters, at a basic level, prior to covering them in depth in later chapters to emphasize core ideas.

Pedagogical methods employed in the modification of the book include addressing the disconnection between general and organic chemistry courses. Freshman Chemistry II (CHEM 1212) has traditionally focused on mathematical problem solving but has little content on structure. Organic chemistry is largely conceptual, based on structure and reactivity. Early topics in organic chemistry rely on student's understanding of Lewis structures and hybridization which is generally covered toward the middle of the semester in Freshman Chemistry I (CHEM 1211). These topics will be reintroduced in the Acids and Bases chapter in the context of organic Lewis acids and bases late in the semester. Traditionally, Lewis acids and bases are covered on a cursory level and in connection to complex inorganic ions. This will be changed to studying Lewis acids and bases of organic molecules and will also require repeating the study of hybridization. An OER Organic Chemistry textbook such as (Organic Chemistry with a Biological Emphasis by Timothy Soderberg) will be used to import this content into our textbook.

In its current un-reorganized form, the textbook is a static resource that does not allow for students to interact with the learning materials except through assigned homework, reading, and quiz assessments in the WebAssign (Cengage) platform currently employed. To address these deficiencies, new interactive course materials will be embedded in the textbook which will include reading comprehension questions, basic problems, case studies, and short videos to reinforce complex concepts.

Another course improvement will include the development of a question bank, development of case studies and worksheets for use in the lectures and creation of a database of student response system questions to probe deeper ideas. The development of in-class materials are intended to probe deeper learning on difficult concepts and build skills in teamwork, communications and problem solving.

If successful, these changes and new materials will have significant total savings impact on the students at the University of Georgia in the amount of \$400,000 per year. Of equal, if not greater, importance are the enhancements that will be made in terms of student learning not only in Freshman Chemistry but subsequent interdisciplinary STEM courses.

Transformation Action Plan

Team Member Roles

The overall project will be led by Suzanne Ellenberger. Ellenberger is the Director of General Chemistry and the lead instructor for Freshman Chemistry II and is responsible for overall coordination and design of the courses. She will lead the review and creation of the new course materials across the project team. The team members include the instructors of CHEM 1211 and 1212 and are subject matter experts in general chemistry. Joel Caughran, lead instructor for CHEM 1211, and Suzanne Ellenberger will primarily be responsible for reorganization and completion of the textbook. All team members will have access to the textbook and will contribute by reviewing and providing input on developed course materials in each of their respective subject matter areas. All of the team members are versed in techniques that will allow the static book format to move toward a vision that is flexible and interactive. All team members will be involved in writing questions, developing worksheets, case studies, PowerPoint lecture slides and student response system questions.

Suzanne Ellenberger

- Role: project manager, primary author, subject matter expert, instructor of record
- Qualifications: Ph.D. in organic chemistry, Director of General Chemistry, 20+ years of teaching

Joel Caughran

- Role: primary author, subject matter expert, IT expert, instructor of record
- Qualifications: M.S. analytical chemistry, 15 years teaching

Wayne Suggs

- Role: subject matter expert, instructor of record, coding expert
- Qualifications: Ph.D. analytical chemistry, 20+ years teaching,

Douglas Jackson

- Role: subject matter expert, instructor of record, media expert
- Qualifications: Ph.D. organic chemistry, 5+ years of teaching

Sara Blankenship

- Role: subject matter expert, instructor of record,
- Qualifications: Ph.D. biochemistry, 2 years teaching

Ana West

- Role: subject matter expert, instructor of record, media and coding expert
- Qualifications: Ph.D. computational chemistry, 5+ years teaching

Wenjian Du

- Role: subject matter expert, instructor of record, IT expert
- Qualifications: Ph.D. bioinorganic chemistry, 2 years teaching

Rupa Gokal

- Role: subject matter expert, instructor of record,
- Qualifications: Ph.D. organic chemistry 5+ years teaching

Delivery of Materials

New materials or revisions created with ALG finding will be made available to the public under a Creative Commons Attribution License to the GALILEO Open Learning Materials Platform. The materials will also be hosted in WebAssign for sharing and collaboration.

Quantitative & Qualitative Measures

To ensure improvement of student outcomes in the proposed course redesign, a number of quantitative and qualitative measures will be tracked in the project. Baseline data from several semesters prior to use of the newly developed materials such as withdrawal rates, successful versus unsuccessful grade ratios will be tracked. This will be compared to the same data after the inception of the new course materials. Student learning outcomes will be quantitatively assessed through student performance on course assignments including homework, quizzes, exams; scores and national percentile rankings on the American Chemical Society Exams Institute final examination for both CHEM 1211 and 1212.

Student opinions and impressions are also important to monitor and understand the impact of the changes on student satisfaction. A survey will be produced and given to students at the end of each semester to anonymously assess student response regarding their opinion of the impact of the course on their technical skills and the appropriateness of the learning materials. To assure compliance in obtaining survey data, a small number of extra credit points will be given to students who participate.

Timeline

§ May 1: Kickoff meeting. The project will be described to the team members, and, teams and team leaders for the project components will be communicated with specific deadlines for the project components. There will be weekly check-ins for all of the team leaders. All team members will participate. Project Manager: Ellenberger

§ May 20: Kickoff Meeting, Middle Georgia State University Hatcher Conference Center. Ellenberger and at least one other team member will attend.

§ May – June: Evaluate and revise, as needed, course outcomes and learning objectives for CHEM 1211 and 1212. All team members will participate; Team Leader: Caughran

§ May – August: Complete the draft textbook revisions for CHEM 1211 and 1212. Caughran and Ellenberger

§ August – December: Teach from the CHEM 1211 and 1212 OER textbook. Continuous discussions will ensue from the instructors regarding any necessary revisions, additions or deletions from the book. Team Leaders: Ellenberger and Caughran

§ May 2019 – May 2020: Write questions for pre-lecture and post-lecture assignments; weekly quizzes; exams; case studies; and, worksheets for CHEM 1211 and 1212. All content will be written in simple text documents to facilitate the possible adoption to a different electronic engine in the future. All team members will participate. Team Leader: Gokal

§ May 2019 – May 2020: Code the questions and instructional materials in WebAssign. Caughran, Du, Suggs. Team Leader: Suggs

§ May 2019 – May 2020: Write questions for student response systems for CHEM 1211 and 1212. All team members will participate. Team Leader: Blankenship

§ May – August: Create a draft survey for CHEM 1211 and 1212 to be given to other instructors to test its usefulness and clarity. Gokal, Du, Jackson, Blankenship. Team Leader: West

§ November-December: Draft survey data from CHEM 1211 and 1212 students will be collected and evaluated to determine if changes are needed. Gokal, Du, West, Blankenship. Team Leader: Jackson

§ January: Survey data for CHEM 1211 and 1212 will be presented to the entire team to be evaluated to determine if it meets the needs of the team. Gokal, Du, West, Blankenship. Team Leader: Jackson

§ January: Modifications will be made to the survey if necessary and the second draft or final survey for CHEM 1211 and 1212 will be given to other instructors or TA's to determine efficacy. Gokal, Du, Jackson, Blankenship. Team Leader: West

§ April: The survey for CHEM 1211 and 1212 will have been given to students using the new course materials and redesigned curriculum. Survey data will be collected, compiled and evaluated. Gokal, Du, West, Blankenship. Team Leader: Jackson

§ May: The project team will meet to debrief and evaluate the semester's use of the new materials and curriculum redesign and to evaluate the information gathered from the student surveys. All team members will participate. Team Leader: Ellenberger

§ January 2020 – March 2020: Discuss and make necessary changes to the curriculum or course materials based on the debriefing and survey evaluation. All team members will participate. Team Leader: Ellenberger

§ January 2020 – May 2020: Make any necessary changes to the textbook to produce a final version for use in the fall 2020 semester. All team members will participate. Team Leaders: Caughran and Ellenberger

Budget

Suzanne Ellenberger \$5000

Joel Caughran (12 month employee and is not eligible for summer support)

Wayne Suggs \$3600

Douglas Jackson \$3600

Sara Blankenship \$3600

Ana West \$3600

Wenjian Du \$3600

Rupa Gokal \$3600

Book Design/Layout and Copyright Clearance (UNG Press) \$2600

Travel \$800

Sustainability Plan

Freshman Chemistry I and II are large enrollment Core Curriculum and G2C courses that are required for all STEM major discipline students. As it is a required course in numerous disciplines, multiple sections will be offered fall, spring and summer semesters in the foreseeable future. Upon completion, this textbook will be adopted by all sections of Freshman Chemistry I and II (CHEM 1211 and 1212) at the University of Georgia. As enrollment increases, it will continue to impact larger numbers of students. Developments made to this course through this grant program will have a major and lasting effect on students in Georgia.

The proposer as well as the team members are all regular instructors of this course and will be able to maintain and update course materials into the future. It is not anticipated that the factual material in this textbook will require updating, the inclusion of materials from other disciplines (for example biology, physics) will need to be periodically revisited. The audiovisual resources will need to be updated periodically and due to the nature of the methods employed in delivering the content, the question banks will be continuously updated.

Acknowledgment

Grant Acceptance

[Acknowledged] I understand and acknowledge that acceptance of Affordable Learning Georgia grant funding constitutes a commitment to comply with the required activities listed in the RFP and that my submitted proposal will serve as the statement of work that must be completed by my project team. I further understand and acknowledge that failure to complete the deliverables in the statement of work may result in termination of the agreement and funding.



January 11, 2019

To,
The Affordable Learning Georgia (ALG)
Textbook Transformation Grants Review Committee

Subject: Letter of support for the Textbook Transformation grant proposal, Round 13.

Members of the ALG Review Committee,

On behalf of University of Georgia's Office of Instruction, I am pleased to offer my strong support for two grant proposals from the Department of Chemistry to introduce – or extend – the use of OER in three courses (CHEM 1210, CHEM 1211 and CHEM 1212). The total enrollment in these courses is approximately 5000 students annually, ensuring that these grants will have a high impact on lowering the overall cost of textbooks for students. Indeed, the course redesign of CHEM 1210 resulting from this proposal may increase enrollment in CHEM 1210, further increasing the impact of this grant. Also note that the proposed grants continue the efforts initiated last year and which were partially funded by an ALG grant awarded in 2018. Some of these efforts also contribute greatly to UGA's Momentum Year goals.

The first proposal (“Pedagogical Reform and Redesign of General Chemistry I and II”) is a direct extension of the OER efforts in CHEM 1211 (Freshman Chemistry I) and CHEM 1212 (Freshman Chemistry II) that were adopted in 2018 and which resulted in an estimated cost savings of \$130 per student. The adoption of OERs for these courses, allowed faculty to redesign these courses and modify their pedagogy to adopt greater levels of active learning, which has been shown to result in better learning outcomes for students. Another benefit of the course redesign has been to better integrate the content in these classes to the overall learning goals – not just in General Chemistry but to other disciplines as well. These curricular and pedagogical modifications have now necessitated additional changes to the OER, which includes the creation of some new content (including a question bank for homework and self-study, pre-lecture problems, quizzes and exams) as well as restructuring of some existing contents. This ALG proposal will help faculty achieve these goals, and will provide students an OER resource that is more pertinent to their coursework and overall learning objectives.

The second proposal (“Curricular Redesign of the Basics of Chemistry (CHEM 1210)”) is to redesign CHEM 1210 (Basics of Chemistry) while adopting OER as its primary textbook. The course redesign is intended to transition this course from a remedial course in support of CHEM 1211, to one that serves to meet the Chemistry requirement for students who are pursuing degrees in non-STEM majors. As with other CHEM courses, this course redesign will also adopt an active learning pedagogical model, and the ALG grant will allow faculty to not just secure an appropriate OER but also help them create supplementary instructional materials, exercises, homework materials, case studies, virtual laboratory experiments and the like.

UGA has a robust support system to assist faculty with curricular redesign, pedagogical innovation and general instructional support offered through the Office of Instruction as well as the Office of the

Provost. We have invested significantly in improving our teaching support and continue to push the boundary for instructional innovation on many fronts. As an example, we are currently implementing several programs to further improve our teaching and learning environment (see the report of President's Task Force on Student Learning and Success here: https://president.uga.edu/resources/documents/final_task_force_report.pdf). Increasing and sustaining adoption of OERs is another high priority for UGA and we have devoted a number of resources towards this goal, including an "OER Fellows Program," an OER Consulting service and small internal grants program. We remain committed to improving student success while lowering the overall costs for students and OER are an important aspect of this overall goal. For this reason, we strongly believe that the work initiated through the ALG grant can be sustained at UGA.

Thank you for your consideration of these proposals.

Sincerely,



Rahul Shrivastav, Ph.D.
Vice President for Instruction



Textbook Transformation Grants, Round Fourteen (Summer 2019 – Summer 2020) Proposal Form and Narrative

Notes

- The proposal form and narrative .docx file is for offline drafting and review. Submitters must use the InfoReady Review online form for proposal submission.
- The only way to submit the official proposal is through the online form in Georgia Tech's InfoReady Review. The link to the online application is on the [Round 14 RFP Page](#).
- The italic text we provide is meant for clarifications and can be deleted.

Applicant, Team, and Sponsor Information

The **applicant** is the proposed Project Lead for the grant project. The **submitter** is the person submitting the application (which may be a Grants Officer or Administrator). The submitter will often be the applicant – if so, leave the submitter fields blank.

Institution(s)	University of Georgia
Applicant Name	Suzanne Ellenberger
Applicant Email	suzanne.ellenberger@uga.edu
Applicant Phone #	706-542- 6225
Applicant Position/Title	Director of Freshman Chemistry and Lecturer
Submitter Name	
Submitter Email	
Submitter Phone #	
Submitter Position	

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.

	Name	Email Address
Team Member 1	Suzanne Ellenberger	suzanne.ellenberger@uga.edu
Team Member 2	Wayne Suggs	dwsuggs@uga.edu
Team Member 3	Sara Blankenship	sara.blankenship@uga.edu
Team Member 4	Wenjian (Vince) Du	wenjian.du@uga.edu
Team Member 5	Ana West	ana.west@uga.edu
Team Member 6	Rupa Gokal	rugokal@uga.edu
Team Member 7	Joel Caughran	caughran@uga.edu
Team Member 8	Douglas Jackson	dmjackson@uga.edu

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

--

Please provide the sponsor's name, title, department, and institution. The sponsor is the provider of your Letter of Support.

Dr. Rahul Shrivastav Vice President of Instruction

Project Information and Impact Data

Title of Grant Project	Pedagogical Reform and Redesign of Freshman Chemistry I and II
Type of Grant	"Gateways to Completion"
Requested Amount of Funding	\$30,000.00
Course Names and Course Numbers	Freshman Chemistry I (CHEM 1211) and Freshman Chemistry II (1212)
Final Semester of Project	Summer 2020
Average Number of Students Per Course Section Affected by Project	280
Average Number of Sections Affected by Project in One Academic Year	24
Total Number of Students Affected by Project in One Academic Year	6,000
Average Number of Students Affected per Summer Semester	400
Average Number of Students Affected per Fall Semester	3,000
Average Number of Students Affected per Spring Semester	2,600
Title/Author of Original Required Materials	MindTap General Chemistry by Vining (textbook and pre-lecture homework assignments), Cengage, \$130 for four semesters WebAssign (weekly progress checks and exams) \$28 per semester Turning Technologies (student response system) \$50 for five years
Original Total Cost Per Student	\$208.00 for CHEM 1211 and 1212

Post-Project Cost Per Student	\$56.00 WebAssign (homework and quiz platform) per year \$50.00 Student Response System per 5 years
Post-Project Savings Per Student	\$100.00 per year
Projected Total Annual Student Savings Per Academic Year	\$400,000
Using OpenStax Textbook?	Yes

Narrative Section

1. Project Goals

The overall goal of the proposed project is to continue the efforts initiated last year, which were partially funded by an ALG grant awarded in 2018, to develop and deploy new open-source, low cost interactive course work materials to all sections of the high-enrollment G2C core curriculum course Freshman Chemistry I and II (CHEM 1211 and 1212). Upon development and deployment of these materials, the team's goal is to achieve significant cost savings for students with an overall impact of \$400,000 per year.

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At UGA, CHEM 1211 and 1212 are taught in a flipped classroom approach that the team believes is superior to a conventional lecture pedagogy. A mandatory, weekly one-hour study session led by Peer Learning Assistants is also employed in the redesign of these courses. Use of an OpenStax textbook, "Atoms First", was implemented in the fall 2018 semester and is currently being used in its unedited, original form. Benefits seen from the preliminary changes in two semesters of use include a decrease in the withdrawal rate of CHEM 1211 students from approximately 25% to 19% in the fall and 13% in the current spring term.

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3. Transformation Action Plan

Team Member Roles

The overall project will be led by Dr. Suzanne Ellenberger. Dr. Ellenberger is the Director of General Chemistry and the lead instructor for Freshman Chemistry II and is responsible for overall coordination and design of the courses. She will lead the review and creation of the new course materials across the project team. The team members include the instructors of CHEM 1211 and 1212 and are subject matter experts in general chemistry. Joel Caughran, lead instructor for CHEM 1211, and Suzanne Ellenberger will primarily be responsible for reorganization and completion of the textbook. All team members will have access to the textbook and will contribute by reviewing and providing input on developed course materials in each of their respective subject matter areas. All of the team members are versed in techniques that will allow the static book format to move toward a vision that is flexible and interactive. All team members will be involved in writing questions, developing worksheets, case studies, PowerPoint lecture slides and student response system questions.

Suzanne Ellenberger

- Role: project manager, primary author, subject matter expert, instructor of record
- Qualifications: Ph.D. in organic chemistry, Director of General Chemistry, 20+ years of teaching

Joel Caughran

- Role: primary author, subject matter expert, IT expert, instructor of record
- Qualifications: M.S. analytical chemistry, 15 years teaching

Wayne Suggs

- Role: subject matter expert, instructor of record, coding expert
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- Role: subject matter expert, instructor of record,
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Ana West

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Rupa Gokal

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- May 2019 – May 2020: Write questions for pre-lecture and post-lecture assignments; weekly quizzes; exams; case studies; and, worksheets for CHEM 1211 and 1212. All content will be written in simple text documents to facilitate the possible adoption to a different electronic engine in the future. All team members will participate. Team Leader: Gokal

- May 2019 – May 2020: Code the questions and instructional materials in WebAssign. Caughran, Du, Suggs. Team Leader: Suggs
- May 2019 – May 2020: Write questions for student response systems for CHEM 1211 and 1212. All team members will participate. Team Leader: Blankenship
- May – August: Create a draft survey for CHEM 1211 and 1212 to be given to other instructors to test its usefulness and clarity. Gokal, Du, Jackson, Blankenship. Team Leader: West
- November-December: Draft survey data from GHEM 1211 and 1212 students will be collected and evaluated to determine if changes are needed. Gokal, Du, West, Blankenship. Team Leader: Jackson
- January: Survey data for CHEM 1211 and 1212 will be presented to the entire team to be evaluated to determine if it meets the needs of the team. Gokal, Du, West, Blankenship. Team Leader: Jackson
- January: Modifications will be made to the survey if necessary and the second draft or final survey for CHEM 1211 and 1212 will be given to other instructors or TA's to determine efficacy. Gokal, Du, Jackson, Blankenship. Team Leader: West
- April: The survey for CHEM 1211 and 1212 will have been given to students using the new course materials and redesigned curriculum. Survey data will be collected, compiled and evaluated. Gokal, Du, West, Blankenship. Team Leader: Jackson
- May: The project team will meet to debrief and evaluate the semester's use of the new materials and curriculum redesign and to evaluate the information gathered from the student surveys. All team members will participate. Team Leader: Ellenberger
- January 2020 – March 2020: Discuss and make necessary changes to the curriculum or course materials based on the debriefing and survey evaluation. All team members will participate. Team Leader: Ellenberger
- January 2020 – May 2020: Make any necessary changes to the textbook to produce a final version for use in the fall 2020 semester. All team members will participate. Team Leaders: Caughran and Ellenberger

6. Budget

The overall projected expenses are as follows and includes personnel expenses and projected costs associated with travel and book design.

Suzanne Ellenberger	\$5000
Joel Caughran	ineligible for support
Wayne Suggs	\$3600
Douglas Jackson	\$3600
Sara Blankenship	\$3600
Ana West	\$3600
Wenjian Du	\$3600
Rupa Gokal	\$3600
Book Design/Layout and Copyright Clearance (UNG Press)	\$2600

Travel

\$800

7. Sustainability Plan

Freshman Chemistry I and II are large enrollment Core Curriculum and G2C courses that are required for all STEM major discipline students. As it is a required course in numerous disciplines, multiple sections will be offered fall, spring and summer semesters in the foreseeable future. Upon completion, this textbook will be adopted by all sections of Freshman Chemistry I and II (CHEM 1211 and 1212) at the University of Georgia. As enrollment increases, it will continue to impact larger numbers of students. Developments made to this course through this grant program will have a major and lasting effect on students in Georgia.

The proposer as well as the team members are all regular instructors of this course and will be able to maintain and update course materials into the future. It is not anticipated that the factual material in this textbook will require updating, the inclusion of materials from other disciplines (for example biology, physics) will need to be periodically revisited. The audiovisual resources will need to be updated periodically and due to the nature of the methods employed in delivering the content, the question banks will be continuously be updated.

Note: Letter of Support