

## Application Details

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### Manage Application: ALG Textbook Transformation Grants Round Five

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**Award Cycle:** Round 5

**Internal Submission Deadline:** Tuesday, December 15, 2015

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**Application Title:** 193

**Submitter First Name:** Kelli

**Submitter Last Name:** Brown

**Submitter Title:** Provost

**Submitter Email Address:** grants@gcsu.edu

**Submitter Phone Number:** 478-445-2754

**Submitter Campus Role:** Sponsored Programs Office

**Applicant First Name:** Chavonda

**Applicant Last Name:** Mills

**Co-Applicant Name(s):** Shaundra Walker

**Applicant Email Address:** Chavonda.Mills@gcsu.edu

**Applicant Phone Number:** 478-445-0819

**Primary Appointment Title:** Associate Professor of Chemistry

**Institution Name(s):** Georgia College & State University

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**Team Members (Name, Title, Department, Institutions if different, and email address for each. Include the applicant in this list.):**

Dr. Shaundra Walker, Associate Director for Instruction and Research, Russell Library, shaundra.walker@gcsu.edu

Dr. Chavonda Mills, Associate Professor of Chemistry, Department of Chemistry, Physics & Astronomy, chavonda.mills@gcsu.edu

**Sponsor, (Name, Title, Department, Institution):**

Dr. Kelli Brown, Provost, Academic Affairs, Georgia College & State University

**Proposal Title:** 193

**Course Names, Course Numbers, and Semesters Offered:**

CHEM 3711 Biochemistry I, Fall

CHEM 3712 Biochemistry 2, Spring

**Final Semester of Instruction (This is your final semester of the project):** Spring 2017

**Average Number of Students per Course Section:** 20-40

**Number of Course Sections Affected by Implementation in Academic Year:** 4

**Total Number of Students Affected by Implementation in Academic Year:** 160

**List the original course materials for students (including title, whether optional or required, & cost for each item):** Lehninger Principles of Biochemistry Sixth Edition by David L. Nelson (Author), Michael M. Cox (Author) - \$303.50, required text

**Proposal Categories:** No-Cost-to-Students Learning Materials

**Requested Amount of Funding:** \$10,800

**Original per Student Cost:** \$303.50

**Post-Proposal Projected Student Cost:** \$0

**Projected Per Student Savings:** 100%

**Plan for Hosting Materials:** LibGuides

### **Project Goals:**

We propose to address the rising cost in college textbooks as well as the need for high-impact pedagogy in higher education by initiating a no-cost-to-students inquiry-based Biochemistry course transformation. The project goals are to:

- Redesign and implement an inquiry-based Biochemistry course using no-cost learning materials.
- Assess the effectiveness of a no-cost inquiry-based Biochemistry course transformation on student success and course success.
- Host open educational resources on existing LibGuides and Institutional Repository sites.
- Expand access to timely and relevant knowledge via library-owned and open-educational resources.

This work will result in a model that will assist other USG Colleges and Departments in their efforts to develop strong, sustainable no-cost-to-students Biochemistry courses.

### **Statement of Transformation:**

In efforts to provide high-impact pedagogy not offered by traditional textbooks, project team member Dr. Chavonda Mills recently designed biochemistry course materials with emphasis on guided inquiry and active learning. Transformation of the current, traditional Biochemistry course to a no-cost course will provide students online access to the aforementioned course materials with the aim of improving student learning and engagement.

The inquiry-based course materials foundation will be a no-cost Biochemistry Free and Easy textbook (Ahern and Rajagopal;<http://biochem.science.oregonstate.edu/biochemistryfree-and-easy>) and additional learning resources identified by project team members. Transforming the course to a no-cost model, particularly by the inclusion of supplemental resources that are available to students via GALILEO, other library subscriptions and open education resources, has the potential to maximize the benefit of existing library resources and also helps to supplement existing course content with the most up-to-date content available. For example, the tau protein, as opposed to the long believed medical culprit beta-amyloid plaque, was recently identified by researchers as a critical component in the development of Alzheimer's disease, a disease state often reviewed in Biochemistry courses during instruction on protein misfolding (Moussa, et. al.). While it is unlikely that the proposed open textbook, which was published in 2012 with an updated version currently in preparation, includes this information, the proposed model will allow the faculty member and librarian to work collaboratively to identify supplemental materials to support this need and provide information to the students in a time-sensitive manner.

Stakeholders affected by the transformation include students enrolled in Biochemistry courses and faculty that teach Biochemistry. Not only does the transformation provide each student a financial savings of approximately \$303.00, a 100% reduction in textbook costs, but, it also presents the opportunity for increased student success by incorporating pedagogy proven to foster student learning (Olson and Riordan). Faculty that adopt the proposed no-cost inquiry-based course model have the potential to improve the success of their courses by using resources which promote student learning through innovative engaged learning activities. Furthermore, the inclusion of resources which offer current and up-to-date biochemical information ensures an optimal learning environment. The inclusion of relevant resources from GALILEO and other library-purchased materials has the potential to extend the institutional value of investment that has been made in purchasing these resources.

### **Transformation Action Plan:**

The proposed transformation action plan, as detailed in the timeline, addresses project objectives and provides activities, a projected timeline, and the responsible party necessary to complete each objective. Responsible parties for completion of project activities include Dr. Chavonda Mills, Associate Professor of Chemistry, and Dr. Shaundra Walker, Associate Director for Instruction and Research. Dr. Mills is the primary instructor for Biochemistry within the department. In Fall 2016, Dr. Mills is scheduled to teach one section of Biochemistry I,

approximately 40 students. This course will serve as the focal point of the pilot study. Dr. Mills will redesign the course to rely solely on no-cost texts and learning resources, including the Ahern's Biochemistry Free and Easy text, self-authored inquiry-based course materials, and purchased biochemistry model kits . Learning outcomes and course concepts will be mapped to selected no-cost resources. At the conclusion of the pilot course, quantitative and qualitative measures will be used to assess student success and course success. Dr. Walker will provide the necessary technical support to host the open-educational and other resources for this project. Dr. Walker will assist Dr. Mills by (1) identifying and accessing supplemental resources to support the course, (2) assisting with the publication of her self-authored inquiry-based course materials on the institutional repository, (3) facilitating access to the resources on the LibGuide and in the institutional repository (Knowledge Box), (4) monitoring access to the resources on both platforms, and (5) providing quantitative usage statistics that will assist in evaluating students' use of the course materials.

**Quantitative & Qualitative Measures:** The following methods will be used to measure students' success in meeting learning outcomes including national and course-level measures as well as course success.

#### Quantitative Measures

Standardized Exam: The American Chemistry Society, the national professional society for chemists, offers standardized exams for Biochemistry courses (henceforth referred to as ACS exams). These also come with normalized data for percentiles and the national mean for the exam. Thus, we are able to compare our students to students across the U.S as well as to baseline data collected from Georgia College students during previous semesters. We have set the standard measure of achievement for ACS exams to be within one standard deviation of the national mean. In addition, pre- and post-test data is taken, to ensure that a significant increase has occurred.

DWF rates: The number of students who Drop, Fail, Withdraw (DFW) from the course will be tracked and compared with baseline data from previously offered course sections.

#### Qualitative Measures

Using Qualtrics survey software, project team members will develop and administer a reflective survey to students in an effort to collect student feedback and provide additional evidence of student success in the transformed course. The survey instrument will allow students to report their gains in knowledge, skills, and dispositions using a 5-point Likert scale and with comments.

#### Timeline:

##### **I. Redesign and implement a Biochemistry course using no-cost learning materials**

- Identify no-cost learning materials and instructional resources (Jan-May 2016)
- Review, select, and adopt no-cost learning materials and instruction resources best suited for meeting course outcomes (Jan-May 2016)
- Course redesign, which includes identifying measurable learning outcomes, activities, and assessments (May-July 2016)

- Purchase biochemistry model kits for classroom use and library study check-out (July 2016)
- Draft course syllabus, which includes course pacing schedule, available resources for each content area, and instruction on accessing selected no-cost learning materials (May-July 2016)
- Implement and pilot redesigned course, including administering ACS pre-and post-exams and reflective survey (Fall 2016)

## **II. Assess the effectiveness of a no-cost Biochemistry course transformation on student success and course success**

- Develop a reflective survey for students in Qualtrics (July 2016)
- Complete data analysis (December 2016)

- DFW rates
- ACS pre-and post-exams
- Student reflective survey

- Review LibGuides and institutional repository statistics to determine student usage. (November 2016)

## **III. Host open educational resources on existing LibGuides and Institutional Repository sites.**

- Create and design new LibGuide for course (May-July 2016)
- Publish inquiry-based course materials in the library's existing institutional repository, including assignment of creative commons and copyright licenses (Ongoing)
- Link inquiry-based course materials and open access textbook to LibGuide (Ongoing)
- Add supplemental resources to LibGuide to support open textbook and inquiry-based course materials in consultation with Dr. Mills (Ongoing)
- Maintain accuracy of resource links and revise content as needed (Ongoing)

## **IV. Submit Final Report (January 2017)**

### **Budget:**

\$10,000 will be used for salary and benefits for Dr. Mills and Dr. Walker

\$800 will be used for attendance to the mandatory kick-off meeting and to purchase model kits @ \$114/each ([www.shop3dmoleculardesigns.com/Flow-of-Genetic-Information-Field-Test-Kitp/fgik.htm](http://www.shop3dmoleculardesigns.com/Flow-of-Genetic-Information-Field-Test-Kitp/fgik.htm)) as classroom resources and for library use to enhance the learning of the students in each class. Five kits will stay in the department available for the teaching faculty to bring into the class or for enhanced instruction during office hours. Two kits will be housed at the circulation desk in Russell Library available for students studying to check out for use in the library.

**Sustainability Plan:**

Following successful project completion and assessment, the no-cost model will be implemented in all Biochemistry courses, which are offered fall, spring and summer semesters.

The platforms that support the project, such as LibGuides and the institutional repository, currently comprise integral parts of the library's infrastructure and will be maintained and enhanced for the foreseeable future. Dr. Walker will set up search alerts on relevant database platforms to identify new published research of potential interest to Dr. Mills, store the research using a citation management program, and provide Dr. Mills with access to the resources for her review and consideration. Course learning materials and resources will be reviewed and updated annually. The Provost has committed to reviewing the course and library model kits every three years for wear & tear and the need for replacement necessary to maintain seven full kits. Dissemination of the model at statewide and national Scholarship of Teaching and Learning (SoTL) conferences presents the potential for course adoption and adaption across USG institutions and beyond.

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courses, the development of which will be spearheaded by Associate Professor of Chemistry, Dr. Chavonda Mills, and supported by Associate Director for Instruction and Research of Russell Library, Shaundra Walker. Each year, Georgia College provides 6,600 undergraduate and graduate students with an exceptional learning environment that extends beyond the classroom, with hands-on involvement with faculty research, community service, residential learning communities, study abroad, and internships. We are the only public institution named as a “College of Distinction” in Georgia for the 8<sup>th</sup> consecutive year, and our institution is regularly named as a “Best Southeastern College” by the Princeton Review, which places us in the top 25 percent of the nation’s four-year colleges.

As Georgia’s designated Public Liberal Arts University, our institution seeks to combine the education experience of private liberal arts colleges with the *affordability* of public higher education. In recent years, affordability has become more and more of a challenge for Georgia’s students, especially with regard to the cost of textbooks. Though the College Board estimates that the average student attending a four-year public college spent \$1,200 on books and supplies in 2012, Georgia College students spent an average of \$1,350 on textbooks during the 2012-2013 academic year. As a growing body of literature suggests, no-cost learning materials are crucial to ensuring student retention and completion of courses. If Georgia College is to contribute to the additional 250,000 graduates needed to enter our state’s growing workforce by 2020, it is imperative that we lower the cost of college for students through initiatives such as the ALG Textbook Transformation program.

Dr. Mills’ project will support the creation of online learning materials for Biochemistry I and II, which are required courses for chemistry majors. Approximately 108 students in six course sections will benefit from replacing the textbook *Principles of Biochemistry* (which normally retails for \$303) with free online materials, including the open access textbook, *Biochemistry Free and Easy* by Drs. Kevin Ahern and Indira Rajagopal. In addition to supporting faculty time to customize online resources, funding will go toward purchasing seven *Flow of Genetic Information* field test kits, which are hands-on learning materials that allow students to model DNA replication, RNA transcription, and translation/protein synthesis. Five kits will be housed in the GC Chemistry Department, and two kits will be available for student checkout in Russell Library. Model kits will be reviewed every three years for wear & tear and evaluated for replacement in order to maintain seven full kits. The Office of the Provost, along with the Office of Grants and Sponsored Projects, will ensure compliance with all State, Board of Regents, and institutional policies and procedures, should we receive funding.

Thank you for your favorable consideration of Georgia College’s application. Please contact me should you have any questions regarding this project.

Best Regards,



Dr. Kelli Brown

Milledgeville • Macon • Warner Robins

Georgia College, the state’s designated public liberal arts university, combines the educational experience expected at esteemed private liberal arts colleges with the *affordability* of public higher education.

**Affordable Learning Georgia Textbook Transformation Grants  
Rounds Three, Four, and Five**

**1.8 REFERENCES**

Ahern, K.; Rajagopal, I., (2012) Biochemistry Free and Easy, Retrieved from:  
<http://biochem.science.oregonstate.edu/biochemistry-free-and-easy>.

Moussa, C.; Schachter, J.; Chen, W.; Hebron, M.; Lonskaya, I. Tau deletion impairs intracellular beta-amyloid-42 clearance and leads to more extracellular plaque deposition in gene transfer models. *Molecular Neurodegeneration* [online] 2014, 9:46 (accessed November 24, 2014).

Olson, S.; Riordan, D. G. Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics. Report to the President; Executive Office of the President: 2012.