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Application Summary

Competition Details

Competition Title:	Textbook Transformation Grants, Round Fifteen (Fall 2019 - Fall 2020)
Category:	University System of Georgia
Award Cycle:	Round 15
Submission Deadline:	09/16/2019 at 11:59 PM

Application Information

Submitted By:	Cathy Hakes
Application ID:	3516
Application Title:	473
Date Submitted:	09/17/2019 at 8:25 AM

Personal Details

Institution Name(s):	Georgia Gwinnett College
Applicant First Name:	Shoshana
Applicant Last Name:	Katzman
Applicant Email Address:	skatzman@ggc.edu
Applicant Phone Number:	470-389-1379
Primary Appointment Title:	Assistant Professor of Biology
Submitter First Name:	Cathy
Submitter Last Name:	Hakes
Submitter Email Address:	chakes@ggc.edu
Submitter Phone Number:	678-407-5875
Submitter Title:	Executive Director, Office of Research and Sponsored Programs

Application Details

Proposal Title

473

Requested Amount of Funding

\$25,800

Priority Category (if applicable)

Upper-Level Courses (3000+)

Final Semester:

Fall 2020

Course Title(s)

Cell Biology

Course Number(s)

BIOL3400K

Team Member 1 Name

Shoshana Katzman

Team Member 1 Email

skatzman@ggc.edu

Team Member 2 Name

Jennifer Hurst-Kennedy

Team Member 2 Email

jhurstkennedy@ggc.edu

Team Member 3 Name

Alessandra L. Barrera

Team Member 3 Email

abarrera@ggc.edu

Team Member 4 Name

Jennell Talley

Team Member 4 Email

jtalley@ggc.edu

Additional Team Members (Name and email address for each)

Rebecca Higgins, rhiggins@ggc.edu

Sponsor Name

Joseph Sloop

Sponsor Title

Interim Dean

Sponsor Department

School of Science and Technology

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

24

Average Number of Sections Affected by Project in One Academic Year

9

Total Number of Students Affected by Project in One Academic Year

216

Average Number of Students Affected per Summer Semester

48

Average Number of Students Affected per Fall Semester

168

Average Number of Students Affected per Spring Semester

N/A for project period

Original Required Commercial Materials (title, author, price, and bookstore or retailer URL showing price)

Title: Essential Cell Biology, 5th edition.

Authors: Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter.

Price: \$130.65.

GGC Bookstore URL: <https://ggc.bncollege.com/shop/ggc/page/find-textbooks>

(Choose Fall 2019, BIOL 3400K, Section 01)

Original Total Cost per Student

\$130.65

Post-Project Cost per Student

\$0

Post-Project Savings per Student

\$130.65

Projected Total Annual Student Savings per Academic Year

\$28,220 for project period

Using OpenStax Textbook?

No

Project Goals

The goals of the project are:

Goal 1. To reduce the costs of completing a degree in higher education by replacing the textbook used in Cell Biology (BIOL 3400K) with a no-cost, open access alternative.

Contributions to Student Savings:

Georgia Gwinnett College (GGC) is located in the most ethnically diverse county in Georgia and strives to provide educational opportunities to our student population at an affordable cost. Part of the mission of GGC is to meet the needs of the local population by providing enhanced learning experiences at a low cost. To help meet the mission of the school and the financial needs of its students, providing low-to-no cost textbook options is as integral as providing low-cost tuition. We aim to reduce the cost of educational materials needed by a large number of STEM majors attending GGC by providing a no-cost textbook for Cell Biology (BIOL 3400K) a sophomore-level course that is a required pre-requisite course for a variety of STEM tracks within the School of Science and Technology (SST). Each academic year, 15 sections of Cell Biology are offered, with an average 7 sections in the fall, 6 sections in the spring and 2 sections each summer. Therefore, after implementation, ~360 students will benefit from adoption of no-cost materials, at a savings of over \$47,000. All faculty teaching Cell Biology has committed to implementing this no-cost textbook in each section of their course, thus ensuring that all students benefit from this project.

Goal 2. To improve student success by providing no-cost, open access course materials.

Contributions to Student Success:

In Cell Biology, each course concept builds heavily on the preceding topics. As such, access to the textbook at the very beginning of the semester is critical to success in BIOL3400K. Students who cannot purchase the textbook for financial reasons are at a severe disadvantage and will tend to struggle to keep up throughout the semester, resulting in poor academic performance. This can be mitigated by providing the textbook to our students online and at no cost.

Additionally, BIOL3400K is our sophomore biology course, yet many of the textbooks for Cell Biology are written for more senior-level students, making the readability of the text more challenging for our students, ultimately resulting in low student interaction with the textbook. Developing a textbook that is more level appropriate will enhance the learning experience for students and should help increase student performance in the course.

Goal 3. To increase student engagement by unifying course content

Pedagogical Transformation:

The Cell Biology Faculty at GGC have spent several semesters identifying 20 specific learning outcomes that align with fundamental concepts in cell biology, using the "Cell Biology Learning Framework" [1] developed by the American Society for Cell Biology and Course Source as a guide. These efforts were made, in part, to develop a specifications grading model (Nilson 2015) for the course. [2] However, it should be noted that delineation of the 20 course learning objectives is also beneficial to faculty using a traditional grading scheme as it clearly defines learning expectations for students. Our current textbook covers far more content than is covered during the semester, making it challenging for students to focus on the content necessary to master the specific learning outcomes. By unifying the content of the textbook and associated diagrams and videos with the learning outcomes, students will have a clearer understanding of what is expected in their learning, ultimately resulting in more mastery of course material.

Statement of Transformation

Overview of the Transformation

Biology is the second most popular major in Georgia Gwinnett College's (GGC) School of Science and Technology, with 34% (n=1,210) of students enrolled in this discipline in fall 2018. The proposed transformation course, Cell Biology with lab (BIOL3400K), is a foundational course in the biology program plan and is a requirement for Biology majors. Moreover, the course can serve as an elective for clinical-focused exercise science majors and students seeking a biology minor. In the past academic year alone, over 350 GGC students took BIOL3400K. Each of these students would have to pay ~\$130 for their BIOL3400K textbook. Eliminating the cost of this textbook would serve as a tremendous financial help to GGC students, especially since textbooks remain a high expense for college students. All Cell Biology faculty members are committed to the implementation of this no-cost textbook into all sections taught, thus benefiting every student at a savings of over \$47,000 per year.

According to the College Board's report [3] on the average estimated undergraduate budgets for 2018-2019, it showed that public 4-year in-state on-campus students should budget ~\$1,101 for books. This budget can be expected to rise as prices of books continue to increase. In fact, an August 26, 2016 article by Robert Kinlaw in News & Observer [4] states that "students now spend over 13% more on average per textbook than they did 10 years ago." An article by Carl Straumsheim in Inside Higher Ed website [5] also stated that efforts to reduce costs are often focused on introductory courses. However, options for low cost or free textbooks are far more limited for upper-level courses, where a single textbook can now cost \$400 or be at their priciest. In fact, he stated, "while efforts to contain costs and increase access to course materials are well underway, those initiatives rarely target upper-level courses. And because of the advanced subject matter, fewer students have likely taken those courses in the past, meaning fewer used textbooks on the market." A strategy to provide access to free or low cost alternatives across an entire degree is especially important for Biology majors since they are more likely to move on to even costlier academic training such as in the medical fields.

With STEM textbooks having low resale value and costs that continue to escalate, the prospect of students purchasing and having a textbook, particularly on the first day of classes is slim. Such is the experience of the team, where nearly one-third of our students did not purchase the book at all or purchased course materials later in the semester. Students who do not purchase the textbook due to financial pressures are at a significant disadvantage for learning content and success in this pre-requisite course required for a variety of STEM majors.

Project's transformative impact on course and department

This transformation provides two major positive impacts on faculty members teaching cell biology and the biology discipline. First, the PIs will be able to generate a lecture curriculum that directly aligns with the student learning outcomes generated for this course. Additionally, faculty members teaching cell biology at other USG institutions will be able to use the developed OER materials in their classrooms.

Cell Biology is a pre-requisite course for a variety of STEM tracks at GGC and the core foundational knowledge received in this course is necessary for student success in other upper-division biology courses. Based on this, student success and retention can be linked to academic performance in cell biology, but also to the content knowledge retained after course completion. Increasing student performance by providing a no-cost textbook that is integrated with the course learning outcomes is expected to increase retention and success in upper-division coursework for a significant number of students in the School of Science and Technology at GGC.

Project's transformative impact on institution

Over 50% of GGC students require financial aid. Among STEM majors, 55.7% are eligible for Pell grants, and 53% are first-generation college students. Most have family and work obligations outside of school. Since the costs associated with required courses can be substantial, providing our students with free, open-access course materials is crucial to easing their financial burden. Through this project, the institution will see the impact on savings on the second largest group of students on campus – those whose major or minor is Biology. This transformation on the Cell Biology course will reduce textbook costs of ~360 GGC students and will result in approximately \$47,000 in student savings per academic year.

Moreover, Cell Biology is a required course in Biology program plans at other USG institutions. By making our textbook publicly available on Open Learning Materials repository, this transformation also has the potential to reduce the financial burden to students outside of GGC, as well as other institutions within the University System of Georgia (USG) and beyond.

Transformation Action Plan

The textbook will be written by Drs. Katzman, Hurst-Kennedy, Barrera, Talley, and Higgins. Currently, our Cell Biology 3400K course has 20 specific learning outcomes. Each instructor listed above will be responsible for developing the chapters associated with four of those learning outcomes. The team members have been assigned learning outcomes based on individual expertise in those areas. Each chapter will consist of the associated text figures and any appropriate open-access videos or supplemental materials that will enhance student learning. We will work together to ensure proper flow of the material by ensuring the introductions and conclusion/summaries of each chapter are structured similarly.

The team will select and adopt/adapt resources from the following OER sites to create the modules:

- Open Textbook Library: <https://open.umn.edu/opentextbooks/>
- OpenStax: <https://openstax.org/>
- MERLOT: <https://www.merlot.org>
- OER Commons: <https://www.oercommons.org/>
- GALILEO Open Learning Materials: <https://oer.galileo.usg.edu/>
- Course Source: <https://www.coursesource.org/courses/cell-biology>
- iBiology: <https://www.ibiology.org>
- Khan Academy: <https://www.khanacademy.org/coach/dashboard>

The materials generated by each team member will be reviewed by the other team members and by other faculty teaching Cell Biology and will be revised, based on feedback provided. The finalized product will be disseminated internally through GGC's learning management system and externally through the USG Open Learning Materials Repository.

Once fully implemented in all sections of Cell Biology (projected fall 2020), the cell biology course materials will reflect the change. The syllabus will identify that no textbook purchase is necessary. All generated materials will be uploaded to the cell biology courses for easy access by students and faculty.

Team members' roles

All five team members, Drs. Katzman, Hurst-Kennedy, Barrera, Higgins, and Talley have taught Cell Biology over several semesters/years during their time at GGC. Each team member will serve as a subject matter expert and instructional designer for the individual learning outcomes that they will be responsible for during textbook development.

Each team member will:

- Assemble textbook material, including text, figures, and associated supplemental materials and videos for four specific learning outcomes for the course.
- Assist other team members in the collection, tabulation, and analyzation of data obtained from assessment materials.
- Edit and refine the materials generated by the other team members.

The list below summarizes the course material that each team member will be responsible for during textbook development.

Team Member: Dr. Katzman

Course Material (Learning outcome topics): Responsible for generating course materials related to: 1) the RNA modifications made after transcription is completed, 2) the role of various RNAs in the process of translation, 3) the structure and function of cytoskeletal filaments and 4) the capabilities of stem cells and their potential therapeutic application.

Team Member: Dr. Barrera

Course Material (Learning outcome topics): Responsible for generating course materials related to the topics of: 1) the properties of the plasma membrane, 2) the functions of transporters and channels within the plasma membrane, 3) the electrochemical gradient across the plasma membrane and 4) the processes involved in vesicle formation and docking.

Team Member: Dr. Hurst-Kennedy

Course Material (Learning outcome topics): Responsible for generating course materials related to the topics of: 1) the methods of cell communication, 2) the structure and function of protein receptors, 3) the regulation of cell cycle

checkpoints, and 4) the processes of necrosis and apoptosis.

Team Member: Dr. Talley

Course Material (Learning outcome topics): Responsible for generating course materials related to the topics of 1) the process of transcription 2) the process of translation, 3) gene regulation in eukaryotes and 4) the process of DNA replication.

Team Member: Dr. Higgins

Course Material (Learning outcome topics): Responsible for generating course materials related to the topics of: 1) the process of DNA condensation, 2) the role of regulator elements in gene expression in prokaryotes and eukaryotes, 3) the process of transporting proteins in to the nucleus, and 4) the process of transporting proteins into mitochondria and the endoplasmic reticulum.

Additional Roles:

Dr. Katzman, Assistant Professor of Biology. As PI of this grant will develop a schedule for content submission by team members, distribute materials to team members for editing, and generate assessment materials for the course. Her additional roles will be:

- Lead instructional designer for the course, compiling materials, and ensuring continuity of instructional delivery from all modules contributed by team members.
- Design assessment instruments to measure the impact of the OER on student attitudes and content knowledge.

Dr. Hurst-Kennedy, Associate Professor of Biology and Chair of Studies. As the Chair of Studies of the biology discipline, she can ensure that both PIs are scheduled to teach Cell Biology for all semesters of the grant.

Dr. Barrera, Associate Professor of Biology, will serve as the subject-matter expert in educational teaching tools.

Plan for providing access

The course materials developed will be uploaded and accessible to GGC faculty and students enrolled in the course using the GGC Brightspace (D2L) Learning Management System (<https://ggc.view.usg.edu/d2l/home>). The materials will also be uploaded into the USG Open Learning Materials repository (<https://oer.galileo.usg.edu/all-textbooks/>) for open-source access by faculty and students at other institutions.

Quantitative & Qualitative Measures

The project team will acquire quantitative and qualitative data utilizing different types of evaluation tools to gather information on our three goals. Our assessment will focus on perception of online materials, experience related to learning outcomes, and student success related to grade improvements and retention.

The project team will request IRB (Institutional Review Board) approval for the project's evaluation plan, including content assessment and student attitudes.

Quantitative Measures, Methods, and Tools

IRB approval will be sought for all surveys that will be administered.

Student success

Students will be assessed via midterm exams and/or final exams in their knowledge of the content of the 20 specific learning outcomes provided at the start of the semester. The data acquired during the project period (summer and fall 2020) will be compared to data acquired in fall 2019 and spring 2020. (Goal 2)

Data including grade distribution and drop/fail/withdrawal rates will be compared for the project period to data collected prior to implementation of OER. (Goal 2)

The Colorado Learning Attitudes about Science Survey (CLASS) developed by Semsar, Knight, Birol, and Smith [6] and self-designed content quizzes will also be administered at the start and end of the semester to determine the gains, if any, in content knowledge and scientific perspectives. This survey tool has previously been approved by the IRB committee at GGC, and the data collected for this project will be analyzed via tools such as Excel or R statistical analysis software. (Goal 2)

Student retention

The team will survey students and determine how many students used the free, online materials versus the number who would have purchased the traditional textbooks. Given the research data that supports the role of OER improving student retention and success, we suspect that we will see an increase in student success and retention in the course with OER. The survey will also collect information regarding gender and ethnicity to determine the impact on underrepresented groups in STEM disciplines. (Goal 2)

Student satisfaction

The team will survey students on elements of student satisfaction with the current textbooks and the OER in their respective semesters, as they pertain to ease of use, accessibility, and helpfulness with regard to achieving learning objectives. This will be achieved using survey questions that assess student satisfaction using a Likert scale (strongly agree to strongly disagree). (Goal 3)

Qualitative Measures, Methods, and Tools

Student satisfaction/perception

The team will survey students to seek qualitative student feedback and suggestions for improvement. The survey will also include open-ended questions regarding GGC offering no-cost BIOL3400K textbooks and the impact of no-cost textbooks to their success in the course. (Goals 1-2).

Tentative survey questions:

- Did you feel that the textbook aligned with the learning outcomes for the course?
- Did use of the online textbook help you to understand the content taught in the course?

Faculty assessment

The team members will provide their assessment of the overall success and impact of the project through an end-of project survey. (Goals 1-3)

Tentative survey questions:

- Were there any challenges and/or accomplishments you experienced while utilizing the OER materials?
- Did your students prefer the online textbook/materials to hard cover textbook? If yes, what were some of their comments? If not, what were some of the challenges they encountered?
- What additional materials would assist you to better adopt the OER?
- What additional materials or changes should be made so that (1) students are better prepared to use the newly

transformed textbook and (2) other faculty members will be successful in adopting the online materials?

Student success

Cell Biology is a pre-requisite for a variety of upper level courses for STEM majors at GGC. Team members will ask the faculty teaching these upper level courses to provide their assessment of the success and impact of the project based on student readiness and performance in those upper level classes in comparison to performance before implementation of the no-cost open access textbook. (Goals 1-2)

Tentative survey question:

- Do you feel that students entering your course were better prepared for their upper division coursework after attending a class where the online textbook was used as compared to before implementation of OER materials in 3400K?
- Did student performance in your course improve as compared to before implementation of OER materials in 3400K?

Timeline

Project Start Date: Expected to start November 1 (after Kick-off meeting).

The preparation of this upper-level textbook and the ancillary materials is work intensive. The rest of fall and all of spring will be used to compile the text, figures and videos, and edit between the various authors.

Fall 2019

Each team member will gather materials to complement the learning outcomes that they are responsible for, including the written text, videos, and figures and will compile this information into individual modules. The assessment plan and instruments will be finalized during this semester.

Spring 2020

During the beginning of the semester, PIs will complete the work started in fall 2019. After generation of new materials has been completed, the PIs will then compile the individual chapters and send the compiled materials to all of the team members for editing. This semester will provide the opportunity to refine and edit the textbook.

Summer 2020

Summer sections of cell biology will pilot the use of the textbook in the classroom (~48 students). This will allow us to implement the textbook change with a smaller cohort of students and provide an additional opportunity for fine-tuning the materials.

Fall 2020

All sections of cell biology (~168 students) will use the newly generated textbook. Materials will need minimal to no changes this term. Data analysis will begin on all assessment measures by both PIs. A report will be generated by the PIs and submitted by the end of the grant period.

Budget

Type of Grant: Large-Scale Transformation

Funds in the amount of \$25,800 are requested for:

A. Personnel: \$25,000

Funds are requested to cover compensation and fringe (FICA/SS, FICA Med, and Retirement) of Dr. Shoshana Katzman, Dr. Rebecca Higgins, Dr. Jennell Talley, Dr. Jennifer Hurst-Kennedy, and Dr. Alessandra Barrera.

Each member will receive \$5000, as the workload will be split equally among all of the team members. Each team member will be responsible for 20% of the completed textbook, including text, videos, and other pedagogical materials. In addition, all team members will be responsible for the generation of assessment materials for the course and will be involved in the collection, tabulation, and analysis of data obtained from assessment materials.

\$5000 will be allocated to Dr. Katzman for her role as lead instructional designer of the course and her efforts in assembling and editing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Hurst-Kennedy for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Barrera for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Talley for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Higgins for her role in establishing textbook material and assisting in collection and analysis of assessment data.

B. Travel: \$800

Funds are requested for at least 2 contributing team members to attend the kick-off meeting at \$400 each. Travel will cover mileage, per diem, and other travel requirements.

Sustainability Plan

The Cell Biology course impacts all students seeking biology majors, and some students seeking a biology minor (as an elective). Biology majors must complete the cell biology course before graduation. There are approximately 15 sections taught each academic year. These materials will be adopted **by all sections of cell biology** starting fall 2020, which will result in a large-scale, department-wide, transformation. Each subsequent academic year that the OER is implemented will impact over ~360 students at a savings of over \$47,000. The team has discussed this project with and received the endorsement of the Biology faculty who teach Cell Biology as well as the Cell Biology course coordinators who organize the course and adopt the textbook. This endorsement will ensure that the project is sustained and the newly transformed textbook will be institutionalized after funding is over. After the implementation of the OER, the team members will meet each semester to discuss the textbook and decide if any updates need to be made to existing materials.

The team members also aim to present this work at regional and national meetings including the American Association for Cell Biology (ASCB) and the Association for Southeastern Biologists (ASB) to share resources and promote the adaptation of open-source materials.

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.

August 13, 2019

Re: Affordable Learning Georgia, University System of Georgia

1000 University Center Lane
Lawrenceville, GA 30043
Phone: 678-407-5602
www.ggc.edu

Dear Grant Selection Committee:

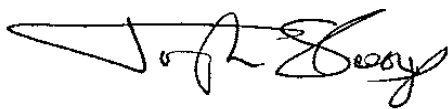
I am pleased to write this letter of support for Drs. Shoshana Katzman, Jennifer Hurst-Kennedy, Alessandra Barrera, Jennell Talley, and Rebecca Higgins for their *No-or-Low-Cost-to-Students Learning Materials* ALG grant application.

This proposal is to develop a no-cost textbook for BIOL3400K/Cell Biology with Laboratory. This will lower the costs to students associated with this course and will likely improve academic performance and retention.

All faculty members involved have each taught BIOL3400K for several years. They have the expertise and skills to successfully implement the proposed action plans within the grant. If awarded, I will support their endeavors by providing the necessary resources to develop the proposed no-cost learning materials.

Thank you for your consideration and please let me know if I can provide any additional information.

Sincerely,



Joseph Sloop, Ph.D.
Interim Dean, School of Science and Technology
Georgia Gwinnett College



Textbook Transformation Grants, Round Fifteen
(Fall 2019 – Fall 2020)
Proposal Form and Narrative

Applicant, Team, and Sponsor Information

Institution(s)	Georgia Gwinnett College
Applicant Name	Shoshana Katzman
Applicant Email	skatzman@ggc.edu
Applicant Phone #	470-389-1379
Applicant Position/Title	Assistant Professor of Biology
Submitter Name	Cathy Hakes
Submitter Email	chakes@ggc.edu
Submitter Phone #	678-407-5875
Submitter Position	Executive Director, Office of Research and Sponsored Programs

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	Shoshana Katzman	skatzman@ggc.edu
Team Member 2	Jennifer Hurst-Kennedy	jhurstkennedy@ggc.edu
Team Member 3	Alessandra L. Barrera	abarrera@ggc.edu
Team Member 4	Jennell Talley	jtalley@ggc.edu
Team Member 5	Rebecca Higgins	rhiggins@ggc.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.

Joseph Sloop, Interim Dean of the School of Science and Technology, Georgia Gwinnett College

Project Information and Impact Data

Title: Transformation to a No Cost Cell Biology Textbook

Priority Category / Categories	Upper Level Campus Collaborations
Requested Amount of Funding	\$25,800
Course Names and Course Numbers	Cell Biology BIOL3400K
Final Semester of Project	Fall 2020
Average Number of Students Per Course Section Affected by Project	24
Average Number of Sections Affected by Project in One Academic Year	9
Total Number of Students Affected by Project in One Academic Year	216
Average Number of Students Affected per Summer Semester	48
Average Number of Students Affected per Fall Semester	168
Average Number of Students Affected per Spring Semester	N/A for project period
Original Required Commercial Materials	Required book: Essential Cell Biology, 5 th edition Authors: Bruce Alberts, Dennis Bray, Karen Hopkin, Alexander D. Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Price: \$130.65. GGC bookstore URL: https://ggc.bncollege.com/shop/ggc/page/find-textbooks (Choose Fall 2019, BIOL 3400K, Section 01)
Total Price of Original Required Materials Per Student	\$130.65
Post-Project Cost Per Student	\$0
Post-Project Savings Per Student	\$130.65
Projected Total Annual Student Savings Per Academic Year	\$28,220 for project period
Using OpenStax Textbook?	No

Narrative Section

1. PROJECT GOALS

The goals of the project are:

Goal 1. To reduce the costs of completing a degree in higher education by replacing the textbook used in Cell Biology (BIOL 3400K) with a no-cost, open access alternative.

Contributions to Student Savings:

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Goal 2. To improve student success by providing no-cost, open access course materials.

Contributions to Student Success:

In Cell Biology, each course concept builds heavily on the preceding topics. As such, access to the textbook at the very beginning of the semester is critical to success in BIOL3400K. Students who cannot purchase the textbook for financial reasons are at a severe disadvantage and will tend to struggle to keep up throughout the semester, resulting in poor academic performance. This can be mitigated by providing the textbook to our students online and at no cost.

Additionally, BIOL3400K is our sophomore biology course, yet many of the textbooks for Cell Biology are written for more senior-level students, making the readability of the text more challenging for our students, ultimately resulting in low student interaction with the textbook. Developing a textbook that is more level appropriate will enhance the learning experience for students and should help increase student performance in the course.

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2. STATEMENT OF TRANSFORMATION

Overview of the Transformation

Biology is the second most popular major in Georgia Gwinnett College's (GGC) School of Science and Technology, with 34% (n=1,210) of students enrolled in this discipline in fall 2018. The proposed transformation course, Cell Biology with lab (BIOL3400K), is a foundational course in the biology program plan and is a requirement for Biology majors. Moreover, the course can serve as an elective for clinical-focused exercise science majors and students seeking a biology minor. In the past academic year alone, over 350 GGC students took BIOL3400K. Each of these students would have to pay ~\$130 for their BIOL3400K textbook. Eliminating the cost of this textbook would serve as a tremendous financial help to GGC students, especially since textbooks remain a high expense for college students. All Cell Biology faculty members are committed to the implementation of this no-cost textbook into all sections taught, thus benefiting every student at a savings of over \$47,000 per year.

According to the College Board's report [3] on the average estimated undergraduate budgets for 2018-2019, it showed that public 4-year in-state on-campus students should budget ~\$1,101 for books. This budget can be expected to rise as prices of books continue to increase. In fact, an August 26, 2016 article by Robert Kinlaw in News & Observer [4] states that "students now spend over 13% more on average per textbook than they did 10 years ago." An article by Carl Straumsheim in Inside Higher Ed website [5] also stated that efforts to reduce costs are often focused on introductory courses. However, options for low cost or free textbooks are far more limited for upper-level courses, where a single textbook can now cost \$400 or be at their priciest. In fact, he stated, "while efforts to contain costs and increase access to course materials are well underway, those initiatives rarely target upper-level courses. And because of the advanced subject matter, fewer students have likely taken those courses in the past, meaning fewer used textbooks on the market." A strategy to provide access to free or low cost alternatives across an entire degree is especially important for Biology majors since they are more likely to move on to even costlier academic training such as in the medical fields.

With STEM textbooks having low resale value and costs that continue to escalate, the prospect of students purchasing and having a textbook, particularly on the first day of classes is slim. Such is the experience of the team, where nearly one-third of our students did not purchase the book at all or purchased course materials later in the semester. Students who do not purchase the

textbook due to financial pressures are at a significant disadvantage for learning content and success in this pre-requisite course required for a variety of STEM majors.

Project's transformative impact on course and department

This transformation provides two major positive impacts on faculty members teaching cell biology and the biology discipline. First, the PIs will be able to generate a lecture curriculum that directly aligns with the student learning outcomes generated for this course. Additionally, faculty members teaching cell biology at other USG institutions will be able to use the developed OER materials in their classrooms.

Cell Biology is a pre-requisite course for a variety of STEM tracks at GGC and the core foundational knowledge received in this course is necessary for student success in other upper-division biology courses. Based on this, student success and retention can be linked to academic performance in cell biology, but also to the content knowledge retained after course completion. Increasing student performance by providing a no-cost textbook that is integrated with the course learning outcomes is expected to increase retention and success in upper-division coursework for a significant number of students in the School of Science and Technology at GGC.

Project's transformative impact on institution

Over 50% of GGC students require financial aid. Among STEM majors, 55.7% are eligible for Pell grants, and 53% are first-generation college students. Most have family and work obligations outside of school. Since the costs associated with required courses can be substantial, providing our students with free, open-access course materials is crucial to easing their financial burden. Through this project, the institution will see the impact on savings on the second largest group of students on campus – those whose major or minor is Biology. This transformation on the Cell Biology course will reduce textbook costs of ~360 GGC students and will result in approximately \$47,000 in student savings per academic year.

Moreover, Cell Biology is a required course in Biology program plans at other USG institutions. By making our textbook publicly available on Open Learning Materials repository, this transformation also has the potential to reduce the financial burden to students outside of GGC, as well as other institutions within the University System of Georgia (USG) and beyond.

3. TRANSFORMATION ACTION PLAN

The textbook will be written by Drs. Katzman, Hurst-Kennedy, Barrera, Talley, and Higgins. Currently, our Cell Biology 3400K course has 20 specific learning outcomes. Each instructor listed above will be responsible for developing the chapters associated with four of those learning outcomes. The team members have been assigned learning outcomes based on individual expertise in those areas. Each chapter will consist of the associated text figures and any appropriate open-access videos or supplemental materials that will enhance student learning. We will work together to ensure proper flow of the material by ensuring the introductions and conclusion/summaries of each chapter are structured similarly.

The team will select and adopt/adapt resources from the following OER sites to create the modules:

- Open Textbook Library: <https://open.umn.edu/opentextbooks/>
- OpenStax: <https://openstax.org/>
- MERLOT: <https://www.merlot.org>
- OER Commons: <https://www.oercommons.org/>
- GALILEO Open Learning Materials: <https://oer.galileo.usg.edu/>
- Course Source: <https://www.coursesource.org/courses/cell-biology>
- iBiology: <https://www.ibiology.org>
- Khan Academy: <https://www.khanacademy.org/coach/dashboard>

The materials generated by each team member will be reviewed by the other team members and by other faculty teaching Cell Biology and will be revised, based on feedback provided. The finalized product will be disseminated internally through GGC's learning management system and externally through the USG Open Learning Materials Repository.

Once fully implemented in all sections of Cell Biology (projected fall 2020), the cell biology course materials will reflect the change. The syllabus will identify that no textbook purchase is necessary. All generated materials will be uploaded to the cell biology courses for easy access by students and faculty.

Team members' roles

All five team members, Drs. Katzman, Hurst-Kennedy, Barrera, Higgins, and Talley have taught Cell Biology over several semesters/years during their time at GGC. Each team member will serve as a subject matter expert and instructional designer for the individual learning outcomes that they will be responsible for during textbook development.

Each team member will:

- Assemble textbook material, including text, figures, and associated supplemental materials and videos for four specific learning outcomes for the course.
- Assist other team members in the collection, tabulation, and analyzation of data obtained from assessment materials.
- Edit and refine the materials generated by the other team members.

The table below summarizes the course material that each team member will be responsible for during textbook development.

Team Member	Course Material (Learning outcome topics)
Dr. Katzman	Responsible for generating course materials related to: 1) the RNA modifications made after transcription is completed, 2) the role of various RNAs in the process of translation, 3) the structure and function of cytoskeletal filaments and 4) the capabilities of stem cells and their potential therapeutic application.
Dr. Barrera	Responsible for generating course materials related to the topics of: 1) the properties of the plasma membrane, 2) the functions of transporters and channels within the plasma membrane, 3) the electrochemical gradient across the plasma membrane and 4) the processes involved in vesicle formation and docking.
Dr. Hurst-Kennedy	Responsible for generating course materials related to the topics of: 1) the methods of cell communication, 2) the structure and function of protein receptors, 3) the regulation of cell cycle checkpoints, and 4) the processes of necrosis and apoptosis.
Dr. Talley	Responsible for generating course materials related to the topics of 1) the process of transcription 2) the process of translation, 3) gene regulation in eukaryotes and 4) the process of DNA replication.
Dr. Higgins	Responsible for generating course materials related to the topics of: 1) the process of DNA condensation, 2) the role of regulator elements in gene expression in prokaryotes and eukaryotes, 3) the process of transporting proteins in to the nucleus, and 4) the process of transporting proteins into mitochondria and the endoplasmic reticulum.

Additional Roles:

Dr. Katzman, Assistant Professor of Biology. As PI of this grant will develop a schedule for content submission by team members, distribute materials to team members for editing, and generate assessment materials for the course. Her additional roles will be:

- Lead instructional designer for the course, compiling materials, and ensuring continuity of instructional delivery from all modules contributed by team members.
- Design assessment instruments to measure the impact of the OER on student attitudes and content knowledge.

Dr. Hurst-Kennedy, Associate Professor of Biology and Chair of Studies. As the Chair of Studies of the biology discipline, she can ensure that both PIs are scheduled to teach Cell Biology for all semesters of the grant.

Dr. Barrera, Associate Professor of Biology, will serve as the subject-matter expert in educational teaching tools.

Plan for providing access

The course materials developed will be uploaded and accessible to GGC faculty and students enrolled in the course using the GGC Brightspace (D2L) Learning Management System (<https://ggc.view.usg.edu/d2l/home>). The materials will also be uploaded into the USG Open Learning Materials repository (<https://oer.galileo.usg.edu/all-textbooks/>) for open-source access by faculty and students at other institutions.

4. QUANTITATIVE AND QUALITATIVE MEASURES

The project team will acquire quantitative and qualitative data utilizing different types of evaluation tools to gather information on our three goals. Our assessment will focus on perception of online materials, experience related to learning outcomes, and student success related to grade improvements and retention.

The project team will request IRB (Institutional Review Board) approval for the project's evaluation plan, including content assessment and student attitudes.

Quantitative Measures, Methods, and Tools

IRB approval will be sought for all surveys that will be administered.

Student success

Students will be assessed via midterm exams and/or final exams in their knowledge of the content of the 20 specific learning outcomes provided at the start of the semester. The data acquired during the project period (summer and fall 2020) will be compared to data acquired in fall 2019 and spring 2020. (Goal 2)

Data including grade distribution and drop/fail/withdrawal rates will be compared for the project period to data collected prior to implementation of OER. (Goal 2)

The Colorado Learning Attitudes about Science Survey (CLASS) developed by Semsar, Knight, Birol, and Smith [6] and self-designed content quizzes will also be administered at the start and end of the semester to determine the gains, if any, in content knowledge and scientific perspectives. This survey tool has previously been approved by the IRB committee at GGC, and the data collected for this project will be analyzed via tools such as Excel or R statistical analysis software. (Goal 2)

Student retention

The team will survey students and determine how many students used the free, online materials versus the number who would have purchased the traditional textbooks. Given the research data that supports the role of OER improving student retention and success, we suspect that we will see an increase in student success and retention in the course with OER. The survey will also collect information regarding gender and ethnicity to determine the impact on underrepresented groups in STEM disciplines. (Goal 2)

Student satisfaction

The team will survey students on elements of student satisfaction with the current textbooks and the OER in their respective semesters, as they pertain to ease of use, accessibility, and helpfulness with regard to achieving learning objectives. This will be achieved using survey questions that assess student satisfaction using a Likert scale (strongly agree to strongly disagree). (Goal 3)

Qualitative Measures, Methods, and Tools

Student satisfaction/perception

The team will survey students to seek qualitative student feedback and suggestions for improvement. The survey will also include open-ended questions regarding GGC offering no-cost BIOL3400K textbooks and the impact of no-cost textbooks to their success in the course. (Goals 1-2).

Tentative survey questions:

- Did you feel that the textbook aligned with the learning outcomes for the course?
- Did use of the online textbook help you to understand the content taught in the course?

Faculty assessment

The team members will provide their assessment of the overall success and impact of the project through an end-of project survey. (Goals 1-3)

Tentative survey questions:

- Were there any challenges and/or accomplishments you experienced while utilizing the OER materials?
- Did your students prefer the online textbook/materials to hard cover textbook? If yes, what were some of their comments? If not, what were some of the challenges they encountered?
- What additional materials would assist you to better adopt the OER?
- What additional materials or changes should be made so that (1) students are better prepared to use the newly transformed textbook and (2) other faculty members will be successful in adopting the online materials?

Student success

Cell Biology is a pre-requisite for a variety of upper level courses for STEM majors at GGC. Team members will ask the faculty teaching these upper level courses to provide their assessment of the success and impact of the project based on student readiness and performance in those upper level classes in comparison to performance before implementation of the no-cost open access textbook. (Goals 1-2)

Tentative survey question:

- Do you feel that students entering your course were better prepared for their upper division coursework after attending a class where the online textbook was used as compared to before implementation of OER materials in 3400K?
- Did student performance in your course improve as compared to before implementation of OER materials in 3400K?

5. TIMELINE FOR IMPLEMENTATION IN FALL 2020 SEMESTER

Project Start Date: Expected to start November 1 (after Kick-off meeting).

The preparation of this upper-level textbook and the ancillary materials is work intensive. The rest of fall and all of spring will be used to compile the text, figures and videos, and edit between the various authors.

Fall 2019

Each team member will gather materials to complement the learning outcomes that they are responsible for, including the written text, videos, and figures and will compile this information into individual modules. The assessment plan and instruments will be finalized during this semester.

Spring 2020

During the beginning of the semester, PIs will complete the work started in fall 2019. After generation of new materials has been completed, the PIs will then compile the individual chapters and send the compiled materials to all of the team members for editing. This semester will provide the opportunity to refine and edit the textbook.

Summer 2020

Summer sections of cell biology will pilot the use of the textbook in the classroom (~48 students). This will allow us to implement the textbook change with a smaller cohort of students and provide an additional opportunity for fine-tuning the materials.

Fall 2020

All sections of cell biology (~168 students) will use the newly generated textbook. Materials will need minimal to no changes this term. Data analysis will begin on all assessment measures by both PIs. A report will be generated by the PIs and submitted by the end of the grant period.

6. BUDGET

Type of Grant: Large-Scale Transformation

Funds in the amount of \$25,800 are requested for:

A. Personnel: \$25,000

Funds are requested to cover compensation and fringe (FICA/SS, FICA Med, and Retirement) of Dr. Shoshana Katzman, Dr. Rebecca Higgins, Dr. Jennell Talley, Dr. Jennifer Hurst-Kennedy, and Dr. Alessandra Barrera.

Each member will receive \$5000, as the workload will be split equally among all of the team members. Each team member will be responsible for 20% of the completed textbook, including text, videos, and other pedagogical materials. In addition, all team members will be responsible for the generation of assessment materials for the course and will be involved in the collection, tabulation, and analyzation of data obtained from assessment materials.

\$5000 will be allocated to Dr. Katzman for her role as lead instructional designer of the course and her efforts in assembling and editing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Hurst-Kennedy for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Barrera for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Talley for her role in establishing textbook material and assisting in collection and analysis of assessment data.

\$5000 will be allocated to Dr. Higgins for her role in establishing textbook material and assisting in collection and analysis of assessment data.

B. Travel: \$800

Funds are requested for at least 2 contributing team members to attend the kick-off meeting at \$400 each. Travel will cover mileage, per diem, and other travel requirements.

7. SUSTAINABILITY PLAN

The Cell Biology course impacts all students seeking biology majors, and some students seeking a biology minor (as an elective). Biology majors must complete the cell biology course before graduation. There are approximately 15 sections taught each academic year. These materials

will be adopted **by all sections of cell biology** starting fall 2020, which will result in a large-scale, department-wide, transformation. Each subsequent academic year that the OER is implemented will impact over ~360 students at a savings of over \$47,000. The team has discussed this project with and received the endorsement of the Biology faculty who teach Cell Biology as well as the Cell Biology course coordinators who organize the course and adopt the textbook. This endorsement will ensure that the project is sustained and the newly transformed textbook will be institutionalized after funding is over. After the implementation of the OER, the team members will meet each semester to discuss the textbook and decide if any updates need to be made to existing materials.

The team members also aim to present this work at regional and national meetings including the American Association for Cell Biology (ASCB) and the Association for Southeastern Biologists (ASB) to share resources and promote the adaptation of open-source materials.

8. REFERENCES

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