

**Affordable Learning Georgia Textbook Transformation Grants
Proposal Form**

Please complete per inline instructions; completed form not to exceed four pages.

Institution Name	Armstrong State University		
Team Members (Name, Title, Department and email address for each)	Dr. Jared Schlieper, Assistant Professor of Mathematics, Jared.Schlieper@armstrong.edu Dr. Michael Tiemeyer, Assistant Professor, of Mathematics, Michael.Tiemeyer@armstrong.edu		
Sponsor, Title, Department	Dr. James Brawner, Professor and Head, Department of Mathematics		
Course Name, Course Number and Semester Offered (Spring 2015 Required)	Calculus 1 – Math 1161 – Spring 2015 Calculus 2 – Math 2072 – Spring 2015 Calculus 3 – Math 2083 – Spring 2015 The same text is used in all three courses.		
Average Number of Students in the Course	Calculus 1: 295 Calculus 2: 158 Calculus 3: 68	Number Course sessions per Academic year	Calculus 1: 12 Calculus 2: 6 Calculus 3: 5
Award Category (pick one)	<input checked="" type="checkbox"/> No-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Course Pack Pilots		
List the original course materials for students (including title, whether optional or required, & cost for each item)	<i>Calculus for Scientists and Engineers: Early Transcendentals</i> Required - \$200 MyMathLab Online Homework Optional - \$95		\$87,025 Total Cost
Projected Per Student Cost	\$295	Projected Per Student Savings (%)	100%

1 Project Goals

Adopt an open-source textbook and online homework system for calculus 1, 2, & 3 to bring down the cost of higher education while maintaining academic integrity and success in those courses and bolstering the attitudes of the students and professors about open-source educational resources.

2 Statement of Problem

In an academic year, an average of 295 students take calculus 1, 158 take calculus 2, and 68 take calculus 3. Fortunately, like many math departments, the Armstrong math department has chosen a typical calculus book that is used in calculus 1, 2, & 3. However, the current text costs \$260—through the publisher's website, it's approximately \$300 at the campus bookstore—and it includes an access code to use its associated online homework system, MyMathLab. One reason the department chose the current text was that the cost to students was lower compared to previous text. The previous text is now similarly priced at \$255—again, through the publisher's website—and it also includes access to its associated online homework system, WebAssign. Our current text is moving to a new edition in 2015 along with an expected price increase; every three to five years the publishers release new editions that are generally more expensive than previous ones.

In Fall 2013, approximately 38% of our undergraduate population were first-generation college students and approximately 56% qualified for federal Title IV funding such as Pell Grants, Subsidized loans, etc. Many non-traditional students also populate our calculus sequence, and they tend to have several financial obligations beyond those of traditional students. Although approximately \$300 for a textbook and additional resources for 3 courses may not seem unreasonable, the overwhelming majority of calculus students take only calculus 1. So \$300 is unreasonable economically for our students, especially when considering that calculus has changed very little in the past century. This undue financial burden can hinder academic progress regardless of academic ability.

Open-source textbooks can relieve our students financial burden in the calculus sequence. Several sources are available for finding a quality open-source textbook includ-

ing those mentioned in this call for proposals. One such source is The American Institute of Mathematics(AIM), which has an ongoing Open Textbook Initiative¹ to identify open-source and open-access textbooks suitable for use in a traditional university course. Using AIM's evaluation criteria and recommendations from our department colleagues as a guideline, we aim to adopt a no-cost open-source textbook along with an open-source online homework system for the calculus sequence in order to alleviate part of our students' financial burden.

3 Transformation Action Plan

We will identify the currently available open-source calculus textbooks and online homework systems. Several options include *Calculus* by Strang of MIT, *Active Calculus* by Boelkins of GVSU, and *Calculus* by Guichard of Whitman College. Of these and others we find, we will review each to determine if they cover the required content for calculus 1, 2, and 3 in a fashion that is expected within the department.

After selecting a suitable textbook, we will arrange the order of the content in the textbook to match the generally accepted order within the department. Also, if any content needs to be edited or expanded upon, we would make those changes.

After completion of the text, we will generate and/or write homework problems and sets within the online homework system and run workshops for the departmental faculty to teach them how to use the online homework system.

To measure the quantitative impact of the new text and homework system, we will gather numerical final course grades, DFW rates, and Calculus Basic Skills Exam (CBSE) scores—the CBSE is the assessment created and used by the department to measure the student learning outcomes in calculus—to perform longitudinal comparisons with said data prior to adoption. We will perform these comparisons as matched-sets, using demographic data such as race, sex, traditional/non-traditional and quantitative data such as SAT score ranges and GPA. We hope to see improvement in all quantitative metrics, but at minimum, the open-source resources must not worsen the metrics.

To measure the qualitative impact of the open-source resources on the students, we

¹ <http://aimath.org/textbooks/approved-textbooks/>

will compare the university faculty and course evaluation (FACE) survey before and after the adoption. In addition, we will ask students to complete a questionnaire about the resources, including questions such as "Are you satisfied with the quality of the textbook and online homework system for this course?", "Do you wish the instructors in your other courses would adopt open-source texts and software?", and "Do you think that using no-cost, open-source educational resources has been detrimental to this course?"

Since the newly adopted open-source text would be the first in the department, it is of utmost importance to measure the qualitative impact on the faculty as well. We will also ask the faculty to complete a similar questionnaire to gauge their satisfaction with the text and determine if more edits need to be made to the text.

4 Timeline

January	Identification and review of open-sources texts and software.
February	Selection of text and software; redesign of course outline/syllabus.
March	Creation of homework problems/sets; initial edits to text; status report.
April	Continuation of homework generation; final edits to text.
May	Completion of homework generation.
June	Submission of final report.
Fall '15	Implementation; data collection.

5 Budget

For this proposal we are requesting \$10,800 discussed in the following details. We are requesting \$10,000 for release time for professors Dr. Schlieper and Dr. Tiemeyer. Each professor would receive two course releases in spring semester 2015, each costing \$2,500 per course per professor (amounting to the cost of \$10,000). We also request \$800 for registration and travel expenses for professors Dr. Schlieper and Dr. Tiemeyer. This amount breaks down to \$400 each to cover expenses to attend workshops or conferences that include training sessions for creating quality homework problems for the chosen online homework system, incorporating open-source resources in the curriculum, or presenting our open-source textbook adoption experience.

6 Sustainability Plan

The adoption of the text will begin in Fall 2015 where all sections of calculus 1 will use the newly adopted text, but both calculus 2 and 3 will continue to use the current text. In Spring 2016, all sections of calculus 1 & 2 will use the new text while calculus 3 will once more use the current text. Beginning Fall 2016, all sections of calculus 1, 2, & 3 will use the new text.

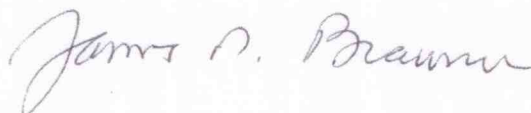
During the first and subsequent semesters in which the new text will be used in each course, the faculty will be asked for edits they wish to see to the text. Since the text is open source, it can be edited to the satisfaction of the mathematics faculty. In fact these edits can be done during the textbook's use and distributed immediately. As we roll out the textbook adoption, we will continue to seek input from the mathematics faculty regarding any possible edits to the text. The same process will occur with the online homework system.

Also, if the quantitative and qualitative assessments demonstrate success with this text, then we will adopt open-source textbooks and software for other courses.

7 References & Attachments

September 3, 2014

Drs. Jared Schlieper and Michael Tiemeyer have written a proposal for a textbook transformation grant. In their proposal they will select a suitable open-source textbook for our sequence of calculus courses, edit the text as needed to fit our learning objectives, and write a series of homework assignments using an open-source online homework system. Both the text and the software will be available to students at no cost. This will provide a tremendous benefit to our students, who often have to pay over \$200 for a calculus text, and around \$100 for an online homework system. In addition to easing the financial burden of our students, the open-source text and software can be fine-tuned to meet the desired learning outcomes, and will be assessed to measure student improvement in the calculus sequence. I heartily endorse this textbook transformation project and believe that it will be a model for future textbook transformations.



James N. Brawner, Ph.D.
Professor and Head of Mathematics
Armstrong State University

September 8, 2014

To whom it may concern,

The Office of Student Engagement and Success in Academic Affairs, wholeheartedly supports the proposal, by Drs. Tiemeyer and Schlieper from the Department of Mathematics, to investigate and adapt open textbooks for our calculus sequence. Funding this project will result in a huge cost savings to our 300 new calculus students each year, specifically benefiting the 150 students who typically only need one calculus course and not the full three course sequence. Thus, this proposed project will have a high impact on all science, technology, engineering and mathematics majors, as well as rehabilitation science and economics majors. The two faculty involved in this project have a history of concern and commitment to student learning through their involvement in other high impact pedagogy such as flipped classrooms, mathematics boot camps and co-remediation course designs.

Armstrong is committed to the success and retention of our students. The Provost's office will assist this trailblazing campus team in any way possible and will work with the Department of Mathematics, as well as the rest of the campus, to broaden the university's adoption of open source materials wherever available. It is hoped that this team will develop a campus model that will assist other faculty and departments in their quest to investigate and adapt open source material, leading to broader sustainability of the open textbook concept at Armstrong.

Thank you for your consideration of this proposal,



Dr. Delana A. Gajdosik-Nivens
Professor of Chemistry
Associate Provost for Student Engagement and Success
Armstrong ALG Champion