

**Affordable Learning Georgia Textbook Transformation Grants  
Round 2  
Summer 2015, Fall 2015, Spring 2016  
Proposal Form and Narrative**

<b>Institution Name(s)</b>	Valdosta State University				
<b>Team Members (Name, Title, Department, Institutions if different, and email address for each)</b>	Shaun V. Ault, Assistant Professor. <a href="mailto:svault@valdosta.edu">svault@valdosta.edu</a> Sudhir Goel, Professor. <a href="mailto:sgoel@valdosta.edu">sgoel@valdosta.edu</a> Department of Mathematics and Computer Science. Valdosta State University				
<b>Sponsor, Title, Department, Institution</b>	Greg Harrell, Department Head Department of Mathematics and Computer Science. Valdosta State University				
<b>Course Names, Course Numbers and Semesters Offered (Summer 2015, Fall 2015, or Spring 2016)</b>	Analytic Geometry & Calculus I, MATH 2261, Fall 2015 – Spring 2016.				
<b>Average Number of Students Per Course Section</b>	35	<b>Number of Course Sections Affected by Implementation In Academic Year 2016</b>	15	<b>Total Number of Students Affected by Implementation In Academic Year 2016</b>	525
<b>Award Category (pick one)</b>	<input checked="" type="checkbox"/> No-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Course Pack Pilots <input type="checkbox"/> Transformations-at-Scale				

<p>List the original course materials for students (including title, whether optional or required, &amp; cost for each item)</p>	<p><b>Required Textbook:</b></p> <p>Thomas, Weir, and Hass, <i>Thomas' Calculus: Early Transcendentals, Single Variable plus MyMathLab, 13ed.</i> Pearson.</p>	<p><b>Cost</b></p> <p>\$141.70 plus tax = \$151.62 / student</p> <p><b>Total Cost</b></p> <p>Up to \$151.62 x 525 = \$79,600.50</p>	
<p><b>Plan for Hosting Materials</b></p>	<p><input type="checkbox"/> <u>OpenStax CNX</u></p> <p><input checked="" type="checkbox"/> <u>D2L</u></p> <p><input type="checkbox"/> <u>LibGuides</u></p> <p><input type="checkbox"/> Other _____</p>		
<p><b>Projected Per Student Cost</b></p>	<p>\$0.00</p>	<p><b>Projected Per Student Savings (%)</b></p>	<p>100%</p>

## 1. PROJECT GOALS

The main focus of this project is to prove the feasibility and effectiveness of replacing the current high-cost (but high quality) required textbook and associated online resources for Math 2261 (Calculus I) by high-quality no-cost instructional materials, including a free electronic textbook, supplemental handouts/worksheets that are either freely available or created specifically by us for this course, and an optional computerized homework system, such as the open-source, freely-available WeBWork system, that could replace MyMathLab. It is important to identify those no-cost options that are not lower in quality or effectiveness than the current (high-cost) options, and so time is needed to evaluate and/or create such materials.

Students in the Calculus sequence currently must purchase a textbook that costs over \$150, which is burdensome, especially to low-income and non-traditional students. Even students who receive financial aid for textbook purchases sometimes have to wait until the second week of classes before the aid becomes available. Although the textbook may be used by students in subsequent Calculus II (Math 2262) and Calculus III (Math 2263) courses, thus spreading the cost out over three semesters, only a small fraction of Calculus I students do carry on through the entire sequence. In particular, Biology majors do not typically take Calculus II.

The USG's Affordable Learning Georgia initiative provides a unique opportunity for us to explore options and implement them in pilot courses of Math 2261 during Fall 2015 and Spring 2016, which could lead to implementation of the no-cost model throughout all 15 sections of Math 2261 per year that are offered starting in Fall 2016. After full scale implementation, this project will reduce student textbook costs to \$0.00 for students of Math 2261, a course that has been identified as one of the Top 50 USG Lower-Division Courses.

As an added benefit, the supplements that we develop will be tailor-made for the students of VSU. Many of our students enter Calculus without an adequate background in Algebra or Trigonometry. They may have poorly-developed study skills on top of a general fear of math. We plan to include materials that will directly address such shortfalls.

## 1.1 TRANSFORMATION ACTION PLAN

There are two phases planned. In the first phase, which will occur during Summer 2015, we will explore many different no-cost resources, falling under three main categories (there may be overlap): Textbook, Supplements, and Homework Materials.

We will evaluate the electronically-available textbook options, including those on the Approved Textbook list from the American Institute of Mathematics (<http://aimath.org/textbooks/approved-textbooks/>). Textbooks will be evaluated in comparison to the current text, Thomas' Calculus. Only the highest-quality text that is also the best fit for the students at VSU will be chosen.

Supplements include handouts, worksheets, and review materials that could be helpful to students of Calculus. Dr. Ault already has put together a number of such supplements for use in his existing courses, while Dr. Goel has experience writing extensive practice materials for College Algebra. Other supplements will be located from free online sources or developed by us during Summer 2015.

Finally, an important component of any math class is the homework. Some instructors will prefer to assign problems from the textbook, while others might prefer using an online homework system, and there are others who prefer to assign and grade custom-made turn-in homework problems. Some textbooks we consider may include sufficient homework exercises, while others may be lacking. Further homework problems with fully-worked solutions will be written during Summer 2015, if need be. As for an online homework system, WeBWork is the best option, as it is open-source and freely-available (<http://webwork.maa.org/>). Moreover, Dr. Ault has experience writing custom homework problems with solutions for a version of WebWork used at The Ohio State University.

The second phase is a trial run implementation of the new no-cost materials. Dr. Ault is scheduled to teach two sections of Math 2261 in Fall 2015. In order to effectively evaluate the impact of the changes, one course will be taught using the usual materials (Thomas' Calculus textbook with MyMathLab access), while the other will be taught using the selected no-cost resources. Both courses will cover the same topics in the same amounts of lecture time. In order to best evaluate the changes, Dr. Ault plans to administer the same quizzes, tests, and final exam to both sections. In addition, Dr. Goel and one other Calculus instructor, not associated with this grant, will also run pilot no-cost sections of Math 2261 in the Fall.

The syllabus and lecture schedule for the altered course and all supplementary materials will be developed during Summer 2015. No further course redesign is necessary, as the topics discussed in lecture will remain the same. All materials will be easily accessible to students online through BlazeView (D2L) and accessible to instructors via the shared network "V drive". Students who wish to have a "hard copy" of the textbook will be

responsible for printing it themselves. In addition, all of our materials will be made available to the public (**open access**) by placing the documents on Dr. Ault's website,

<https://valdosta.academia.edu/ShawnAult>

which is freely accessible to anyone with an internet connection.

## 1.2 QUANTITATIVE AND QUALITATIVE MEASURES

As outlined above, there will be multiple pilot courses taught using a no-cost format (NC) in Fall 2016. Each pilot will be evaluated in comparison to control courses taught using the current resources (C). As part of this study, we will measure quantitative metrics such as the **effectiveness** of NC (do students achieve similar or better levels of mastery of Calculus?), **retention rates** (are students less likely to drop the course?), and qualitative metrics, such as **perception** (are students less stressed by the NC course, or do they have a more positive opinion of the course or instructor, etc).

- Effectiveness will be assessed by comparing the mean scores on quizzes, tests, and final exam of students in NC courses with students in the C courses. The validity of the data is ensured by the fact that the quizzes, tests, and final exam will be similar to those given in the past in this course and hence are known to accurately assess Calculus understanding.
- Retention rates will be gathered. The rate for NC courses will be compared not only with that of C courses, but also with the rates for past (recent) sections of Calculus I.
- Student surveys will be administered at various points in the semester to the students of both NC and C courses in order to measure the qualitative impact of using no-cost versus typical course resources.

### 1.3 TIMELINE

February 2<sup>nd</sup> : Project initiation meeting (kick-off). Dr. Ault will attend.

May 11<sup>th</sup> – 22<sup>nd</sup>

- Begin reviewing and evaluating no-cost textbooks for Calculus, starting with the AIM Approved Textbook list.
- Set up WeBWorK on a VSU server.

May 25<sup>th</sup> – June 5<sup>th</sup>

- Once a textbook has been settled on, determine if there are sufficient homework exercises. If not, begin compiling a comprehensive list of exercises for each section.
- Choose WeBWorK problems for each Calculus topic, and begin writing new problems if needed.

June 8<sup>th</sup> – 31<sup>st</sup>

- Finish writing homework exercises and/or WeBWorK problems.
- Identify helpful supplementary handouts and worksheets from existing sources.
- Write additional supplementary handouts and worksheets to fill any remaining needs in the course.

August 3<sup>rd</sup> – 14<sup>th</sup>

- Modify the syllabus for the section that will implement no-cost materials.
- Place all electronic materials, including the textbook, on the BlazeView site for the course.
- Write surveys for students to collect qualitative data about both courses.
- Mid-implementation project status report.

August 17<sup>th</sup> – December 11<sup>th</sup>

- Fall semester. One course is taught with no-cost materials, while a sister course is taught using Thomas' Calculus with MyMathLab
- Administer an entrance survey, a midterm survey, and an exit survey.

December 14<sup>th</sup> – 18<sup>th</sup>

- Prepare final report that will be disseminated to appropriate recipients.

Spring 2016: The Department of Math/CS will discuss moving forward with the no-cost format for all Math 2261 sections starting Fall 2016.

#### **1.4 BUDGET**

Summer pay for Dr. Ault: \$5000 in salary and benefits.

Summer pay for Dr. Goel: \$5000 in salary and benefits.

Travel funds: \$800 for travel to attend the required project initiation meeting (kick-off) on February 2<sup>nd</sup>, 2015. Dr. Ault will attend.

**Total: \$10800.**



## **1.5 SUSTAINABILITY PLAN**

After the pilot no-cost course has been evaluated for effectiveness, retention, and positive perceptions, and if the Department of Math/CS agrees to move forward on wider implementation, we will facilitate the transition of all sections of Math 2261 to a no-cost format starting in Fall 2016. This will be an easy transition, as all of the materials will have been developed by the beginning of Fall 2015 – it would be as easy as a textbook change. From that point onward, the courses do not require extra maintenance.

## 1.6 REFERENCES & ATTACHMENTS

- *Letters of Reference:*
  - *Dr. Greg Harrell*

**1.7 PROPOSAL SUBMISSION: ALL PROPOSAL DOCUMENTS, REFERENCES, AND ATTACHMENTS MUST BE SUBMITTED IN A SINGLE EMAIL TO [ALG@GATECH.EDU](mailto:ALG@GATECH.EDU).**

**DEADLINE FOR CATEGORIES 1-3: 5:00 PM, NOVEMBER 30, 2014**

**DEADLINE FOR CATEGORY 4: 5:00 PM, DECEMBER 8, 2014**