Affordable Learning Georgia Textbook Transformation Grants
Rounds Four and Five
For Implementations Beginning Spring Semester 2016
Running Through Spring Semester 2017

Proposal Form and Narrative

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Sponsor, Title, Department, Institution	*Dr. John Cruthirds, Department Chair of Mathematics, University of North Georgia; john.cruthirds@ung.edu*
Proposal Title	No-cost replacement of the high cost required materials for four mathematics courses (College Algebra, Pre-Calculus, Elementary Statistics, and Calculus II)
Course Names, Course Numbers and Semesters Offered	1. *College Algebra; Math 1111, offered every Fall, Spring, and Summer* 2. *Pre-Calculus; Math 1113, offered every Fall, Spring, and Summer* 3. *Elementary Statistics; Math 2400, offered every Fall, Spring, and Summer* 4. *Calculus II; Math 2460, offered every Fall, Spring, and Summer*
Final Semester of Instruction	Fall 2016

Average Number of Students Per Course Section	30	**Number of Course Sections Affected by Implementation in Academic Year**	35	**Total Number of Students Affected by Implementation in Academic Year**	1050

Award Category (pick one)	☒ No-Cost-to-Students Learning Materials ☐ OpenStax Textbooks ☐ Specific Top 50 Lower Division Courses		
List the original course materials for students (including title, whether optional or required, & cost for each item)	**Course**	**Course Materials**	**Optional /Required & cost[e-book: hard cover]**
	College Algebra (Math 1111)	Julie Miller, College Algebra, McGraw Hill; 2014	Required $133.35
		ConnectMath Homework software	Optional $98.70
	Pre-Calculus (Math 1113)	Stewart, Redlin & Watson, Algebra and Trigonometry, 3rd Edition,	Required

		Brooks/Cole;2012	$206.80
		WebAssign Homework software	Optional $92
	Elementary Statistics (Math 2400)	Fundamentals of Statistics by Michael Sullivan (Fourth Edition)	Required $98
	Calculus II (Math 2460)	Calculus. Early Transcendental Functions 6th edition by Larson & Edwards (Publisher: Brooks/Cole)	Required $299.70
		WebAssign Homework Software	Optional $118

| **Original Per Student Cost**	1. College Algebra (Math 1111) – $98.70 (with e-text) to $133.35 (with hardcover) 2. Pre-Calculus (Math 1113) - $92 (with e-text) to $206.80 (with hardcover) 3. Elementary Statistics (Math 2400) - $98 (with e-text) 4. Calculus II (Math 2460) - $118 (with e-text) to $299.70 (with hardcover)
Post-Proposal Projected Per Student Cost	$0 (100% savings)
Projected Per Student Savings	1. From $98.70 to $133.35 for College Algebra (Math 1111) 2. From $92 to 206.80 for Pre-Calculus (Math 1113) 3. $98 for Elementary Statistics (Math 2400) 4. From $118 to $299.70 for Calculus II (Math 2460)
Plan for Hosting Materials	☐ OpenStax CNX ☒ D2L ☐ LibGuides ☒ Other – Shared Class Files
Requested Amount of Funding	$21,200

NARRATIVE

1.1   PROJECT GOALS

There are three goals that the project intend to achieve

1. To Replace high-cost required textbooks by high-quality and affordable instructional materials, through Open Education Resources, at zero cost to students.
2. To improve education quality and student's learning by providing easy access valuable textbooks and supplement materials with zero cost to students. These chosen open resources and constructed materials (short video lectures, notes, open textbooks materials and videos) will be mapped to the objectives and topics of each course to maintain syllabus consistency and provide better capacity to meet learning goals of each course. Materials will be accessed through D2L and shared class files.
3. To incorporating a free computerized homework and quiz delivery and grading system (WeBWork) into each course. Commercial software is usually costly and most students do not take the advantage of using the software because they can't afford buying them.

It is a fact that purchasing a high-cost required textbook is a burdensome to students and in particular to low-income and non-traditional students. Even students who receive financial aids sometimes have to wait until the second week of classes before the aid become available. This project will make all instructional materials available to all students in the four courses from day one of the semester with no cost. As a result, this project serves to increase retention and progression in the course and raise awareness to students regarding resources that available to them at no cost.

1.2   STATEMENT OF TRANSFORMATION
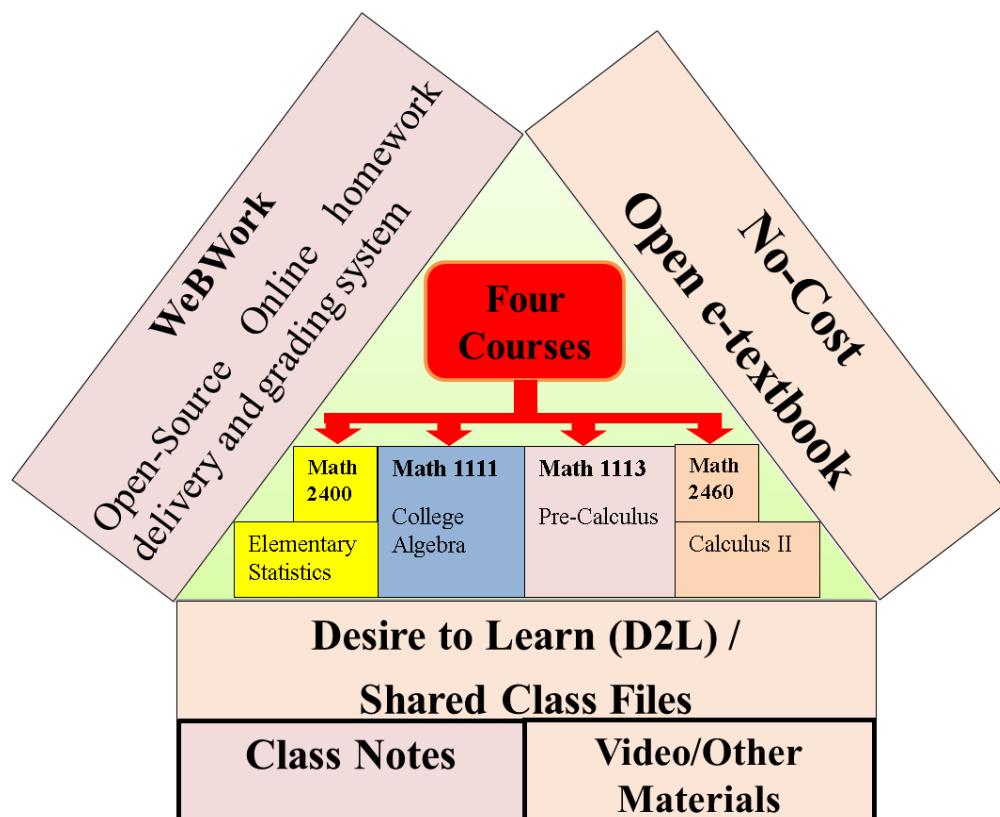
For the four courses, College Algebra, Pre-calculus, Elementary Statistics, and Calculus II, online texts from Affordable Learning Georgia open online texts will be adopted and will be linked to D2L or Shared Class Files. To improve teaching and learning, WeBWork, a free open-source online computerized homework-generating and grading system, will be used for homework and quizzes. Since video lectures help students develop conceptual understanding and motivation (Ruthven & Hennessy, 2002), we will link supplemental micro video lectures and practice exercises from Khan Academy or YouTube for the appropriate sections in D2L and Shared Class Files. In addition we plan to create additional short video lectures or videos for reviews using Camtasia Studio. Thus, students will access the aforementioned open resources on D2L or Shared Class Files with no cost to students.

The primary stakeholders are students. Utilizing the Affordable Learning Georgia Textbook Transformation Grant, students will have opportunities to learn using materials with the same educational recourses and similar instructional methods to commercial resources at no cost. In addition, students will be prepared for upper-level mathematics courses in an innovative educational environment at a minimum of expense.

The faculty members who teach these courses are also stakeholders. Mathematics faculty will have the opportunity to use innovative open resources with the same quality of

commercial texts and materials. Instructors have the opportunity to use their time more efficiently and better develop their pedagogical methods through this project. For example, instructional materials in D2L or Shared Class Files will serve as a guide providing no-cost-to-student learning materials. In addition, we will post and share our quizzes and homework assignments through WeBWorK. Each faculty member can utilize the same problem sets for their quizzes and homework on WeBWorK because WeBWorK changes the numerical values using the same question forms. Thus, this project will encourage faculty to align their instruction with sound pedagogical methods and innovative open educational recourses for College Algebra, Pre-Calculus, Elementary Statistics, and Calculus II because of the high quality of teaching materials, reduction in financial concerns for students, and easy access to our class websites on D2L and Shared Class Files.

This project will have immediate impact for approximately 1,050 students to reduce their cost of learning materials each academic year (see Table 1). In addition, a total savings in the year of implementation will be at least $96,600.

Table 1. Cumulative saving cost of Spring, Summer, and Fall 2015				
Course	The number of sections from College Algebra, Pre-Calculus, Statistics, and Calculus II	The number of students	The minimum cost for a text (at least $92): College Algebra $98.70 (with e-text), **Pre-Calculus** **$92 (with e-text),** Statistics $98(with e-text), Calculus II $118 (with e-text)	Total cost savings
Spring 2016	10	300	$27,600 ($92×300)	$27,600
Summer 2016	Possible 10	300	$27,600 ($92×300)	$27,600
Fall 2016	15	450	$41,400 ($92×450)	$41,400
Total	35	1050		$96,600

1.3   TRANSFORMATION ACTION PLAN

There are four components of the action plan for this project:

1. Review and development
Each team member will review all course materials and identify research in terms of adopting free educational open resources in order to find the most appropriate open texts. We will develop a syllabus for each course and replace a commercial textbook with a free open text from Affordable Learning Georgia and incorporate computerized homework by using WeBWorK.

2. Creation of open education rescores
We will create PDF lecture notes or Power Points. We will create homework assignments and quizzes for each section of each course on WeBWorK and make these assignments available to faculty who teach these courses. Mr. Thomas Hartfield and Dr. Kim will utilize their expertise to create additional video lectures using Camtasia Studio.

3. Integration
We will search for appropriate videos and interactive multimedia content. We will link short videos or interactive multimedia content to the PDF lecture notes or Power Points based on topics for the four courses.

4. Implement in College Algebra, Elementary Statistics, and Calculus II (sections taught by only grant members)
The open texts, online lecture notes with linked video and interactive multimedia, and WeBWorK for each course will be uploaded into D2L or Shared Class Files.

1.4   QUANTITATIVE AND QUALITATIVE MEASURES

i)   To evaluate this project, data will be collected from three different data sources: Drop, Fail, Withdraw (DFW) rate from Banner Web. This data will then be cross tabulated along with the preliminary assessment and Cumulative Final exam results.

Rubric							
Course	Total no. of stud. Registered	Preliminary assessment (median)	Withdraw %	Drop %	Cumulative Final exam (median)	Pass %	Fail % Individual Scores are less than 60%
College Algebra (Math 1111)							
Pre-Calculus (Math 1113)							
Calculus II (Math 2460)							
Elementary Statistics							

(Math 2400)							

Data for the rubric will be collected from Spring 2016 for all the above mentioned courses which will be analyzed with a similar set of data from control courses taught in a traditional fashion using an actual text book and/or an online publishers' website. The linear correlation will be examined to study the interplay between "no cost" courses and "students' success/retention".

ii) Technological Competency: The students' Internet skills, retrieving and managing information via technology will be evaluated at least three times during the semester period via online survey and assessments through D2L. Data like how often and how long a student is logged in to the online learning system WeBWorK or accessing OpenStax text books and how that corresponds to their successful completion of the course will be collected. For all these data the appropriate central tendencies and variabilities will be calculated. These statistics will be used as point estimates to estimate the population parameters for the entire UNG Mathematics student population. The final results will be closely administered and studied thoroughly to determine necessary improvements and easier accessibility of the course resources.

iii) Students' feedback through survey: Students will be asked to participate in anonymous surveys about the overall effectiveness of the "no cost" courses at least twice during the semester. We plan to conduct an initial survey early in the term with a final survey near the end of the semester. A separate survey will be conducted to determine students' progress which will target the following areas: how regularly or reluctantly students are attaining lectures or attending classes; to what degree the major assignments are being completed; the degree of efficiency in completing major assignments; and the level of student participation in class work and/or discussions. Moreover, the principal investigators will conduct a self-assessment of the experience of adopting the **Affordable Learning Georgia** initiatives.

At the conclusion of the semester a general report based on the rubric will be created for peer evaluation and the following learning outcomes will be evaluated:

1. Students will be able to identify and relate to the course specific topic mastery requirements.
2. Students will be able to relate each of the course topics with at least one real life application problem and master it.
3. Students will be able to develop skills for **reading Mathematics course materials** and retain the information with ease.
4. Students will exhibit the characteristic of self-directed learners.

Finally, we will ask students if they encountered any difficulties using the materials accessible through the internet or their mobile devices so that the courses can be made easier to access from anywhere using a wide variety of devices such as tablets and smartphones.

1.5   TIMELINE

10/1/2015	Kick-off meeting to construct learning materials for the four courses (Math 1111; Math 1113; Math 2400; and Math 2460).
10/15/2015	Finalize reviewing and evaluating no-cost e-textbooks. Map the learning objectives (stated in UNG syllabi) of each of the four courses to the sections of the texts selected from the e-textbook. Modify each course syllabus to reflect the changes.
11/30/2015	Complete creation of learning materials to include class notes and short videos for each of the four courses based on the selected no-cost e-textbook.
12/15/2015	Complete creation of assignments in WeBWork for each of the four courses. [WeBWork is already installed in UNG-Gainesville server]
12/18/2015	Submit a semester status report to ALG
12/20/2015	Finalize the learning materials and upload all needed electronic materials to D2L and UNG WeBWork site to make sure that all four courses are ready for delivery in the Spring 2016 semester.
January 11, 2016-April 29, 2016	1/12/2016 Pre-test completed for the four courses Implementation: Piloting of course materials for the four classes – Spring 2016 semester. 4/28/2016 Complete data collection and complete Post-test (the four courses)
May 2016	Review and modify the piloted materials
May 20, 2016	Submit a semester status report to ALG
Summer 2016	Implement possibly 10 sections for the four courses
August 12, 2016	Submit a semester status report to ALG
Fall 2016	Implement 15 sections for the four courses; conduct discussions with colleagues and the department Curriculum Committee to see if implementation on a larger scale is an appropriate departmental endeavor.
December 2016	Work on data analysis and evaluating course effectiveness
	Prepare final project report
December 23, 2016	Submit final project report

1.6   BUDGET

Dr. Hashim Saber	Faculty additional time spent for preparation instructional materials	$5,000
Dr. Minsu Kim	Faculty additional time spent for preparation instructional materials	$5,000
Dr. Bikash Das	Faculty additional time spent for preparation instructional materials	$5,000
Mr. Thomas Hartfield	Faculty additional time spent for preparation instructional materials	$5,000
Travel	Kick-off meeting or Conference	$800
Supplementary material	Paper, ink cartridges, and copying cost. etc	$400

1.7   SUSTAINABILITY PLAN

We anticipate good results and a positive impact on student success as a result of piloting the four courses during the first academic year (10 sections in Spring 2016, possibly 10 sections in Summer 2016, and 15 sections in Fall 2016). Materials (Open Textbook, class notes, and WeBWrok assignments) for the four redesigned courses will be available to math instructors who are interested in OER for future terms. The project team members will keep the original copy of the learning material and will maintain and update materials as needed. The D2L part of each course must be updated each semester which can be easily done with help from the UNG-IT department.

1.8   REFERENCES & ATTACHMENTS

Ruthven, K., & Hennessy, S. (2002). A practitioner model of the use of computer-based tools and resources to support mathematics teaching and learning. *Educational studies in mathematics*, *49*(1), 47-88.