

Fall 2015

# Foundations for College Algebra

Michael Goodroe

*University of North Georgia*, michael.goodroe@ung.edu

Berhanu Kidane

*University of North Georgia*, berhanu.kidane@ung.edu

Julian Allagan

*University of North Georgia*, julian.allagan@ung.edu

John Williams

*University of North Georgia*, john.williams@ung.edu

Follow this and additional works at: <http://oer.galileo.usg.edu/mathematics-collections>

 Part of the [Algebra Commons](#)

---

## Recommended Citation

Goodroe, Michael; Kidane, Berhanu; Allagan, Julian; and Williams, John, "Foundations for College Algebra" (2015). *Mathematics Grants Collections*. Book 3.

<http://oer.galileo.usg.edu/mathematics-collections/3>

This Course Syllabus/Schedule is brought to you for free and open access by the Mathematics at GALILEO Open Learning Materials. It has been accepted for inclusion in Mathematics Grants Collections by an authorized administrator of GALILEO Open Learning Materials. For more information, please contact [affordablelearninggeorgia@usg.edu](mailto:affordablelearninggeorgia@usg.edu).

# Grants Collection

University of North Georgia



UNIVERSITY SYSTEM  
OF GEORGIA

Michael Goodroe, Berhanu Kidane, Julian Allagan,  
John Williams

---

# Foundations for College Algebra

---





## Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- **Linked Syllabus**
  - The syllabus should provide the framework for both direct implementation of the grant team's selected and created materials and the adaptation/transformation of these materials.
- **Initial Proposal**
  - The initial proposal describes the grant project's aims in detail.
- **Final Report**
  - The final report describes the outcomes of the project and any lessons learned.



Unless otherwise indicated, all Grants Collection materials are licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

# Syllabus

---



---

# FOUNDATIONS FOR COLLEGE ALGEBRA

---

MATH 0989, FALL 2015

*University of North Georgia*

CRN # 10644; 1:00 pm - 2:50pm MW; Room 320

## INSTRUCTOR

---

---



Name Michael Goodroe

Office 311 B

Phone (706) 310 - 6334

Email [michael.goodroe@ung.edu](mailto:michael.goodroe@ung.edu)

Hours T 01:00pm - 03:00pm

Important Dates 1.) Add/Drop August 17 - 21

2.) Withdrawal October 12

3.) **Final Exam** December 7

@12:40 pm - 2:40 pm

4.) **Math Jam Fridays 12:00pm - 2:00pm**

**Room 320**

## UNG Supplemental Syllabus Links:

<http://ung.edu/academic-affairs/policies-and-guidelines/supplemental-syllabus.php>

<http://ung.edu/academic-affairs/faculty-handbook/3-faculty-responsibilities/3.7-class-attendance-policies/3.7.1-student-attendance-policy.php>

---

---

## COURSE

---

### DESCRIPTION

A course for students needing in-depth preparation in basic mathematics and beginning algebra. The course is required for students whose MPI scores indicate a need for the course and whose major requires College Algebra, MATH 1111. The course will cover the following topics: Real Numbers, Linear Equations and Problem Solving, Exponents and Polynomials, Linear Inequalities, Factoring Polynomials, Rational Expressions and Equation and introduce the following topics: Functions, Systems of Linear Equations, Radicals and Complex Numbers, Quadratics Equations and functions. Students required to take this course must pass with a grade of C or higher before enrolling in MATH 0999. Other students may volunteer to take the course to enhance their current math skills.

---

### COURSE OBJECTIVES

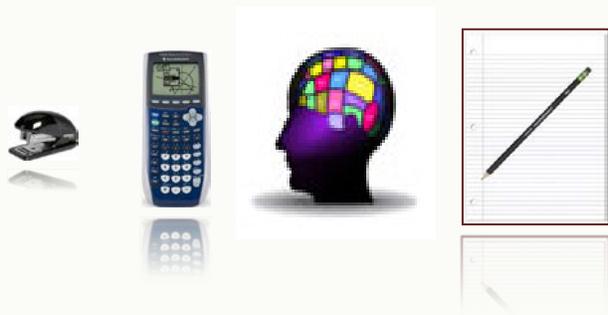
To develop and support the student's math knowledge and skills enabling the student to be successful in MATH 0999 Support for College Algebra along with MATH 1111, College Algebra.

After completion of the course, the student will be able to:

- Identify and perform basic operations on real numbers.
- Translate sentences to algebraic expressions and equations.
- Solve linear equations..
- Use exponential notation and properties of exponents.
- Perform basic operations on polynomials.
- Factor polynomials.
- Perform basic operations on rational expressions.
- Solve a variety of application problems.
- Perform basic operations on radical expressions.
- Solve radical equations.
- Define complex numbers.
- Add complex numbers.

## MATERIALS

---



Course Website: <http://faculty.ung.edu/mgoodroe/index.html>

- Texts:
- 1.) eTextbook - College of the Redwoods - Pre Algebra (COR)  
<http://mathrev.redwoods.edu/PreAlgText/>
  - 2.) eTextbook - College of the Redwoods - Elementary Algebra  
<http://mathrev.redwoods.edu/ElemAlgText/>
  - 3.) eTextbook - College of the Redwoods - Intermediate Algebra  
<http://msenux2.redwoods.edu/IntAlgText>
  - 4.) eTextbook - College of the Sequoias - Intermediate Algebra  
<https://www.cos.edu/Faculty/jonb/Pages/Math-230-Intermediate-Algebra.aspx>
  - 5.) Desmos Graphing Site  
<https://www.desmos.com>

## GRADING

---

Your final grade will be determined as follows:

Exams (3)	45%
Assignments/Quizzes	30%
Final(Cumulative)	25%



## EXAMS

---

Students need to be in the classroom and prepared to take the exam **five minutes prior** to the scheduled class start time. If you will be late, please notify me via email as soon as possible prior to the start of the exam. **If you miss the exam or come late without prior notification and re-scheduling, a grade of zero will be recorded** (see make -up policy below).

**Calculator use:** you may use a **simple hand-held calculator for exams**. However, you will not be permitted to use the calculator function on your cell phone or any Wi-Fi device.

If you need to leave the classroom during the exam, please do so quietly and be respectful of other students.

## MAKEUP WORK

---

**No make-up of exams/quizzes/homework assignments/Projects will be given.** If you miss one of the exams, then your Final Exam score will replace the missed exam. If you take all exams, then the Final Exam score will replace your single lowest score, assuming your final exam score is greater than your lowest exam score.

If you know in advance that you will not be present during an exam, please notify me via email as soon as possible to schedule taking the exam prior to the actual exam date. No exams will be scheduled **after** the actual exam date, only prior.

## POLICIES

---

---

### ATTENDANCE

---

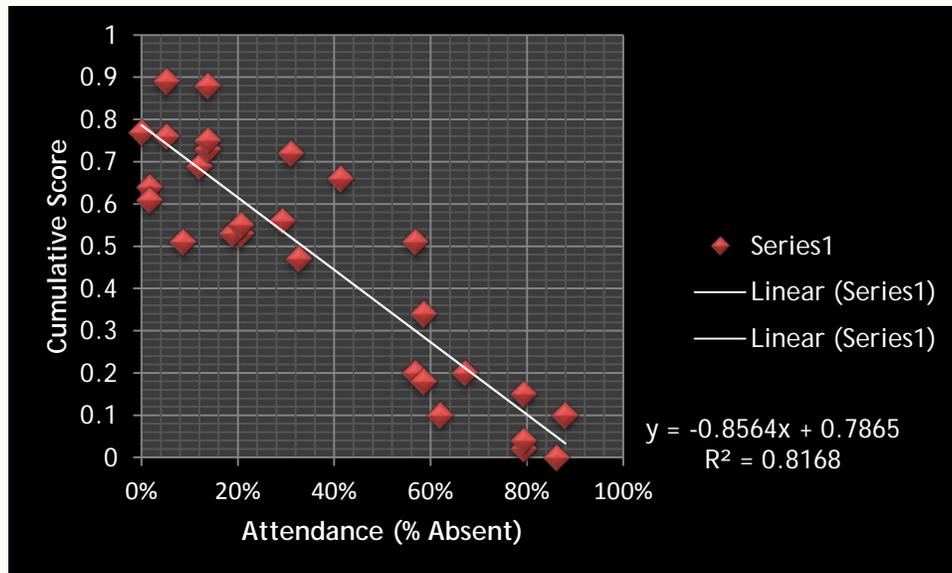
UNG Student Attendance Policy: <http://ung.edu/academic-affairs/faculty-handbook/3-faculty-responsibilities/3.7-class-attendance-policies/3.7.1-student-attendance-policy.php>

Data support the fact that when students regularly attend their mathematics courses, they are much more likely to succeed. Learning mathematics requires students to engage and actively participate in mathematics. Being absent from class greatly reduces your chances to be involved in your own learning. Though attendance in this course is not an element of your cumulative score, students who regularly miss class tend to have very low scores. Therefore, I will record your attendance daily.

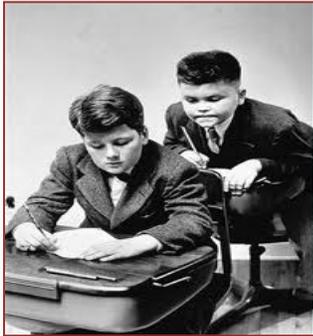
Below is a linear graph from a recent class, which relates the percent of student absences with student's cumulative scores. All my classes have a similar graph! As you can see, as the percent of absences increases to the right on the horizontal axis, cumulative scores decrease on the vertical axis. Conversely, the less a student is absent, say between 0% and 20%, student scores increase. I encourage you to make a personal commitment to attend class regularly and to be proactive in your own education.

**Please be aware that UNG policy states that a student who has missed 10% or more in a class can/will be "WITHDRAWN" from class either receiving a grade of "W" or "WF" depending if absences occur before or after the withdraw date! I will be recording**

attendance everyday starting on the first day through the last day of classes.  
Therefore, you can miss 6 days during the semester.



## SCHOLASTIC DISHONESTY



See attached link of UNG's Student Conduct Code:

<http://ung.edu/academic-affairs/policies-and-guidelines/supplemental-syllabus.phpb>

## DISRUPTIVE BEHAVIOR

Students who exhibit behaviors which are considered to obstruct or disrupt a class or its learning activities will be considered under the Board of Regents Policy on Disruptive Behavior. Behaviors which will be considered to be inappropriate in our classroom include sleeping, eating, coming in late/leaving early, interrupting others, talking out of turn, cell phone use of any kind, inappropriate behavior during group work, verbal or nonverbal behavior that is disrespectful of other students or the teacher. Students who exhibit disruptive behavior will be given a verbal warning for the first infraction. If the behavior continues, the student will be asked to leave the classroom. Prior to returning to our classroom, the student will need to make an appointment to see me during office hours. Any further infractions would be referred to the Disciplinary Committee of the College.

Cell phones:

1. Should be turned off or in silent mode during all classes.

2. Should be put away and not visible during class.
3. Any use of a cell phone, including but not limited to, sending/receiving calls, texting, checking the Internet is not permitted during class, with the exception of Instructor permitted use.

Computers or Tablets:

1. Are not permitted unless prior arrangements are made with your Instructor.

---

## MISCELLANY

---

---

### USEFUL LINKS

---

<http://ung.edu/learning-support/academic-resources.php>

**KHAN Academy:**

<http://www.khanacademy.org/>

Pearson's Intermath:

<http://interactmath.com/ChapterContents.aspx>

MathTV YouTube Channel:

<http://www.youtube.com/user/MathTV>

Purplemath:

<http://www.purplemath.com/>

UNG- Oconee Math

<https://web.ung.edu/media/MathHelp>

---

### ACADEMIC SUPPORT

---

You are strongly encouraged to go to the SRC or LS Math Lab, study in groups, and see me for help outside of class. All of these are free! Students who get help outside of class are typically much more successful than those that do not.

SRC hours are: (Math Tutoring)

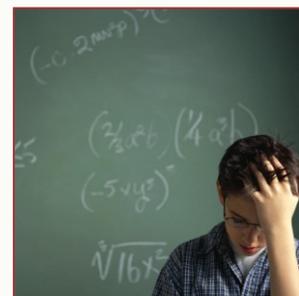
Monday-Friday      8:00 AM - 9:00 PM

<http://www.gsc.edu/academics/labs/oconee/Pages/Math.aspx>

LS Math Lab hours are: (Room 311 B)

Same as Office Hours

**Math Jam Fridays 12:00pm - 02:00pm in room 320**



# Initial Proposal

---

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

<b>Institution Name(s)</b>	<b>University of North Georgia – Oconee Campus</b>				
<b>Team Members</b> (Name, Title, Department, Institutions if different, and email address for each)	1) Mr. Michael Goodroe, M.Ed., Lecturer of Mathematics and Learning Support Liaison of Mathematics; <a href="mailto:michael.goodroe@ung.edu">michael.goodroe@ung.edu</a> 2) Mr. Berhanu Kidane, PhD, Assistant Professor of Mathematics; <a href="mailto:berhanu.kidane@ung.edu">berhanu.kidane@ung.edu</a> 3) Mr. Julian Allagan, PhD, Associate Professor of Mathematics; <a href="mailto:julian.allagan@ung.edu">julian.allagan@ung.edu</a> 4) Mr. John Williams, Med, eLearning and Media Services; <a href="mailto:John.williams@ung.edu">John.williams@ung.edu</a>				
<b>Sponsor, Title, Dept., Institution</b>	Mr. John Cruthirds, PhD, Department Chair of Mathematics, University of North Georgia; <a href="mailto:john.cruthirds@ung.edu">john.cruthirds@ung.edu</a>				
<b>Course Names, Course Numbers and Semesters Offered (Summer 2015, Fall 2015, or Spring 2016)</b>	Introductory Algebra; Math 0097; Fall 2015, Spring 2016, Summer 2016 Intermediate Algebra; Math 0099; Fall 2015, Spring 2016, Summer 2016 College Algebra; Math 1111; Fall 2015, Spring 2016, Summer 2016 Precalculus Math 1113; Fall 2015, Spring 2016, Summer 2016 Calculus 1 Math 1450; Fall 2015, Spring 2016, Summer 2016				
<b>Average Number of Students Per Course Section</b>	<b>30</b>	<b>Number of Course Sections Affected by Implementation in Academic Year 2016</b>	<b>28</b>	<b>Total Number of Students Affected by Implementation in Academic Year 2016</b>	<b>840</b>
<b>Award Category (pick one)</b>	<input type="checkbox"/> No-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Course Pack Pilots <input checked="" type="checkbox"/> Transformations-at-Scale				
<b>List the original course materials for students (including title, whether optional or required, &amp; cost for each item)</b>	<i>Beginning &amp; Intermediate Algebra, Martin-Gay, 5<sup>th</sup> Ed. Required</i> <i>Algebra and Trigonometry, Stewart, Redlin and Watson, 3<sup>rd</sup> Ed. Required</i> <i>Calculus Early Transcendental Functions 6<sup>th</sup> Ed. Larson &amp; Edwards</i>			<b>\$188.33(New)</b>  <b>\$206.08(New)</b>  <b>\$211.20(New)</b>  <b>Total Cost = \$605.61</b>	
<b>Plan for Hosting Materials</b>	<input type="checkbox"/> <a href="#">OpenStax CNX</a> <input checked="" type="checkbox"/> D2L <input type="checkbox"/> <a href="#">Lib Guides</a> <input checked="" type="checkbox"/> Other: <a href="#">UNG Faculty Webpage</a>				
<b>Projected Per Student Cost</b>	<i>Beginning &amp; Intermediate Algebra, \$188.33</i> <i>College Algebra &amp; Precalculus, \$206.08</i> <i>Calculus, \$211.20</i>			<b>Projected Per Student Savings (%)</b>	100% 100% 100%

## 1. PROJECT GOALS

- i) To provide lessons for five courses: Beginning and Intermediate Algebra, College Algebra, Precalculus and Calculus 1 at the University of North Georgia Oconee Campus beginning in the Fall of 2015, using the **Affordable Learning Georgia resources**, at no cost or minimum cost to students.
- ii) To determine options which closely match the curriculum guidelines set forth for each course in the University of North Georgia course catalogue or by individual instructors' course syllabi.

### 1.1 STATEMENT OF TRANSFORMATION

- **Describe the transformation**

- Transformations-at-Scale: In the fall of 2015 we plan to offer five core courses for 16 classes to students at the University of Georgia using the ALG Textbook Grant. These courses are offered at no cost or low cost options. The transformation will have a significant impact on student's text book costs.

- **Identify stakeholders affected by the transformation**

- Students are the primary stakeholders; however mathematics instructors, campus tutors and/or math lab staff, library staff, and IT staff are clearly major stakeholders as well

- **Describe the impact of this transformation on stakeholders and course success.**

- Lowering textbook costs for students while at the same time providing high quality materials with no or low-cost options have the benefit of reducing the financial burdens students face. If on-line options provide the same level of quality as do hardcopy textbooks, then course success for students can focus on instructors and student engagements

- **Category 4 only: Describe the transformative impact on the program, department, institutions, access institution, and/or multiple courses.**

- We won the spring 2015 ALG text book transformation grant. This grant will be used for three algebra courses for 5 classes. The fall 2015 ALG grant application will help extend our spring 2015 program, and it will impact five courses and 28 classes
- Our experience with the spring 2015 ALG grant has inspired a number of colleagues to apply for the fall 2015 grant as they seek to apply this program to statistics courses on the local campus. As the new fall 2015 grant covers more courses, only one math course (MATH 2460) will be left uncovered on our campus. This will be equivalent to less than .01% of our students who might not benefit from this grant.

### 1.2 TRANSFORMATION ACTION PLAN

- **The identification, review, selection, and adoption/adaptation/creation of the new course materials.**

- Identified courses: Introductory, Intermediate and College Algebra, Precalculus, Calculus 1
- Comprehensive digital notes that have been created and have been used by the instructors thus far will be modified and incorporated into the Free Online Resources from **Affordable Learning Georgia**
- The content of other free web based Internet resources such as: **Khan Academy, YouTube, and Desmos Graphing Calculator** that have been used so far will be reviewed. We will select the sections or videos that best reflect the course objectives listed on the instructor's course syllabus. The links to the appropriate source will be made available on the instructor's website for a wider community use

- **The course and syllabus instructional design/redesign necessary for the transformation.**
  - Syllabi that have been in use for teaching the courses will be modified by the course instructors; textbook will not be required for these courses and a list of acceptable online free textbooks will be given in addition to other supplemental resources
- **The activities expected from each team member and their role(s): subject matter experts, instructional designer, librarian, instructor of record, et al.**
  - Each member/instructor has full responsibility for creating a web page, researching the appropriate online free textbooks and lists them for each course he/she will be teaching. Each team member is responsible for modifying his/her syllabi accordingly, and posts on his/her website other supplemental resources that are available free online.
  - John Williams: website design (help create faculty webpages), facilitate technical support on eLearning and media services
- **The plan for providing open access to the new materials.**
  - We propose to adopt on-line texts and associated practice sets of problems and tutorials from Affordable Learning Georgia. In addition to providing the links to the web pages, we make available the learning resources to UNG students online through Shared Classes Files or D2L, and the public UNG Faculty web pages

### 1.3 QUANTITATIVE AND QUALITATIVE MEASURES

#### Learning Objective Success Measures (Quantitative and Qualitative measures)

##### i) Pass, Fail, Withdraw and Drop (PFWD) Rubrics (Quantitative)

- **Spring 2014, Fall 2014 and Spring 2015 PFWD Rubric**

Course Text Book	Semester Year	Total No. Stud./class Registered	Pass %	Fail % A grade of D or less	Withdraw %	Drop %
Beginning & Inter. Algebra <i>Martin-Gay, 5<sup>th</sup> Ed.</i>	Spring 2014					
	Fall 2014					
College Algebra; Stewart, Redlin and Watson, 3 <sup>rd</sup> ed.	Spring 2014					
	Fall 2014					
Precalculus; Stewart, Redlin and Watson, 3 <sup>rd</sup> ed.	Spring 2014					
	Fall 2014					
Calculus I; <i>Larson &amp; Edwards 6<sup>th</sup> Ed.</i>	Fall 2014					
	Spring 2015					

- **Fall 2015 PFWD Rubrics**

- For fall 2015 semester a similar PFWD rubrics will be created and data will be collected and compared

##### ii) **Students Overall Performance (Quantitative)**

- Percentage of Excellent A or Very good B grades

##### iii) Detailed analysis of the rate of success in spring/fall 2014 (pre-grant) compared to that of spring fall 2015 (post-grant) **PFWD Expected Outcomes (Quantitative)**

- Percent pass greater than or equal to \_\_\_\_\_
- Percent fail less than or equal to \_\_\_\_\_
- Percent withdrawn strictly less than \_\_\_\_\_

iv) **Technological Competency** (*Survey feedback, Qualitative*)

- Internet skills, retrieving and managing information via technology
- Use available technology effectively and efficiently to locate, retrieve, and manage information

v) **Student feedback through survey** (*end of semester*)

Questionnaires reflecting qualitative measures <http://www.surveymonkey.com>

#### 1.4 TIMELINE

- Initial effort will be on selecting the appropriate on-line textbooks, which includes determining whether the textbook meets the stated curriculum goals and the objectives of the specific syllabi. To be completed by the end of spring 2015.
- Survey will be given to students based on the adopted on-line texts at the end of spring 2015 and a similar survey will be given by the end of fall 2015
- Adopt on line text textbooks for Precalculus and Calculus end of spring 2015 semester.

#### 1.5 BUDGET

- **Include Personnel & Projected Expenses as appropriate for the category.**

- Material cost, survey-monkey gold plan \$300 annually
- Travel, workshops and conferences \$800
- Faculty/staff additional time spent on preparation of the material \$5,000/person

#### 1.6 SUSTAINABILITY PLAN

- **What is plan for offering the course in the future, including maintenance of course materials?**

- Continue to offer Introductory, Intermediate, and College Algebra courses using on-line texts.
- Expand use of on-line texts to all mathematics courses offered on the UNG Oconee campus with a conservative projected student savings annually of \$200,000 (See **Note** below)
- Continue to enhance current digital support for all math courses
- Explore development of course textbooks
- Expand the program on a Department Level

#### 1.7 REFERENCES & ATTACHMENTS

**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**

*Note:* Number of Math classes:

Summer 2014, 12 classes

Fall 2014, 46 classes

Spring 2015, 43 classes

The annual total number of Math classes is about 100, if we assume 20 students per class and \$100 per math text. Total saving in math books is \$200,000. (This is a conservative estimate)



December 8, 2014

Affordable Learning Textbook Transformation Grant  
Review Committee

Dear Committee Members:

I am writing this letter in support of the proposal being submitted to you by Professors Michael Goodroe, Berhanu Kidane, and Julian Allagan from my department. I am in full support of this proposal because I believe the proposal has strong merit and because Professors Goodroe, Kidane, and Allagan are talented faculty members who are well qualified to accomplish the goals of the proposal.

Michael, Berhanu, and Julian all have significant experience teaching the courses that are targeted in the proposal. I am excited at the potential financial savings our students could experience, and I intend to lend full departmental support for the work of this proposal. Since we teach multiple sections of these courses every semester, including summer, the potential sustainability of the project will not be a concern. The expansion of the project to other sections of these classes on the Oconee campus and on our other three campuses can be accomplished by working through our existing departmental Curriculum Committee which has representation from faculty on all University of North Georgia campuses.

I am in full support of this proposal, and I hope that you will be able to give the proposal every possible consideration. I would be happy to comment further if you so like.

Sincerely,

John Cruthirds, Head  
Department of Mathematics  
[john.cruthirds@ung.edu](mailto:john.cruthirds@ung.edu)  
706 864-1810

# Final Report

---

# Affordable Learning Georgia Textbook Transformation Grants

## Final Report (Round 2)

**Date:** December 15, 2015

**Grant Number:** 125

**Institution Name(s):** University of North Georgia

**Team Members** (Name, Title, Department, Institutions if different, and email address for each): Mr. Michael Goodroe, M.Ed. ([michael.goodroe@ung.edu](mailto:michael.goodroe@ung.edu)), Mr. Berhanu Kidane, PhD. ([berhanue.kidane@ung.edu](mailto:berhanue.kidane@ung.edu)), Julian Allagan, PhD. ([julian.allagan@ung.edu](mailto:julian.allagan@ung.edu)), and Mr. John Williams, M.Ed. ([john.williams@ung.edu](mailto:john.williams@ung.edu)). UNG – Oconee Campus Mathematics Department.

**Project Lead:** Mr. Michael Goodroe

**Course Name(s) and Course Numbers:**

Foundations for College Algebra - Math 0989, Intermediate Algebra - Math 0099,  
College Algebra - Math 1111, Math 1113 – Pre-Calculus, Math 1450 – Calculus I

**Semester Project Began:** Fall 2015

**Semester of Implementation:** Fall 2015

**Average Number of Students per Course Section:** 19

**Number of Course Sections Affected by Implementation:** 8

**Total Number of Students Affected by Implementation:** 152

### 1. Narrative

- Overall positive outcomes

#### Accomplishments:

- Transitioned eight classes which formerly used hard-copy textbooks to on-line textbooks and course materials.
- Development of faculty websites which included all course materials, daily uploaded Smartboard notes, copies of quizzes/activities/assignments/exams, handouts, and syllabi.
- Use of UNG IT survey tool to gain student feedback.

#### Challenges:

- Creating faculty websites so students have a central on-line source to course materials.
- Developing a “content” outline for students to follow the progression of sections using the on-line textbooks
- Finding a “single” on-line textbook which was similar to the hard-copy textbook used on campus.
- No single on-line textbook has the materials needed as required by the university’s course syllabi.
- Requiring students to use more than one source of on-line materials increased their confusion level and overall performance.
- Some students had difficulty “finding” materials on the website.

- Daily updating/maintenance of website is very demanding.
- Practice must be printed out, copied, and handed out during class for additional student practice sets.
- Class activities are graded and students are provided feedback constantly with solutions that are posted online daily.
- Raising students' expectations for a course after they learn that they are not required to buy a textbook for that course.

### **Transformative impacts on instruction:**

- Generally positive acceptance by student.
- Once on-line textbooks were selected and faculty websites were completed, classes ran smoothly.
- No real issues brought to our attention from students by using on-line texts and materials.
- One on-line text, which resides on a college math departmental server, occasionally goes off-line causing access by students difficult.

### **Transformative impacts on students and their performance**

- Mindset transition from hard-copy textbooks to on-line. There is a comfort level perceived by students using hard-copy textbooks.
- Some students expressed difficulty in “finding” various materials on faculty websites.
- General acceptance by most students of on-line materials.

### **Lessons Learned**

- Given what was learned during our Round 1 grant trial, we tried using fewer on-line textbooks per course.
- Provide more “supportive” materials, which expand on the concepts covered in the textbooks.
- Continue to upload daily notes to course website for student reference.
- Conduct more feedback surveys to determine issues students may be having.
- Set student expectations toward learning from on-line recourses.

### **List of Resources Used in the Textbook Transformation**

***Math 0989 - Foundations for College Algebra:*** <http://faculty.ung.edu/mgoodroe/CRN6964.html>

- College of the Sequoias –Pre Algebra <https://www.cos.edu/Faculty/rossr/Pages/Math-360-PreAlgebra.aspx>
- College of the Redwoods - Intermediate Algebra [\(http://www.wtamu.edu/academic/anns/mps/math/mathlab/beg\\_algebra/](http://www.wtamu.edu/academic/anns/mps/math/mathlab/beg_algebra/)
- West Texas A & M University - Beginning Algebra [http://www.wtamu.edu/academic/anns/mps/math/mathlab/int\\_algebra/index.htm](http://www.wtamu.edu/academic/anns/mps/math/mathlab/int_algebra/index.htm)
- West Texas A & M University - Intermediate Algebra <http://msenux.redwoods.edu/IntAlgText/>
- Kuta Software – <http://kutasoftware.com>

**Math 0099 - Intermediate Algebra:** <http://faculty.ung.edu/mgoodroe/CRN6967.html>

- College of the Sequoias – Intermediate Algebra <https://www.cos.edu/Faculty/jonb/Pages/Math-230-Intermediate-Algebra.aspx>
- West Texas A & M University – Intermediate Algebra [http://www.wtamu.edu/academic/anns/mps/math/mathlab/int\\_algebra/index.htm](http://www.wtamu.edu/academic/anns/mps/math/mathlab/int_algebra/index.htm)
- College of the Redwoods – Intermediate Algebra <http://msenux.redwoods.edu/IntAlgText/>
- Kuta Software – <http://kutasoftware.com>

**Math 1111 - College Algebra:** <http://faculty.ung.edu/bkidane/courses.html>

- Open Resource College Algebra free e-book link:
  - <http://www.stitz-zeager.com/szca07042013.pdf> (Main Text Book: by Stitz and Zeager)
- West Texas A & M University – College Algebra [http://www.wtamu.edu/academic/anns/mps/math/mathlab/col\\_algebra/index.htm](http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/index.htm) (free online resource **under fair use**)
- Larry Green's Applet Page <http://www.ltconline.net/greenl/java/index.html> (licensed under a Creative Commons License)
- Khan academy at: <http://www.khanacademy.org>
- YouTube at: <http://www.youtube.com>
- Kuta Software – <http://kutasoftware.com>
- <http://www.mathwarehouse.com/algebra/>
- <http://www.ltconline.net/greenl/java/index.html>
- <http://flashytrig.com/intro/teacherintro.htm> (Animations)

**Math 1113 – Pre-Calculus:** <http://faculty.ung.edu/bkidane/courses.html>

- Open Resource Pre-Calculus free e-book link:
  - <http://www.stitz-zeager.com/szct07042013.pdf> (Main Text Book: by Stitz and Zeager)
- Trigonometry Open resource book by Michael Corral (Secondary Text)
- West Texas A & M University – College Algebra [http://www.wtamu.edu/academic/anns/mps/math/mathlab/col\\_algebra/index.htm](http://www.wtamu.edu/academic/anns/mps/math/mathlab/col_algebra/index.htm)
- Larry Green's Applet Page <http://www.ltconline.net/greenl/java/index.html> (licensed under a Creative Commons License)
- Khan academy at: <http://www.khanacademy.org>
- YouTube at: <http://www.youtube.com>
- Kuta Software – <http://kutasoftware.com>
- <http://www.mathwarehouse.com/algebra/>
- <http://www.ltconline.net/greenl/java/index.html>
- <http://en.wikibooks.org/wiki/Trigonometry>
- <http://flashytrig.com/intro/teacherintro.htm> (Animations)
- <http://www.sosmath.com/trig/trig.html>

*Math 1450 – Calculus I:* [http://faculty.ung.edu/jallagan/Current courses.html](http://faculty.ung.edu/jallagan/Current%20courses.html)

- Open Resource Calculus free e-book link:  
<http://faculty.ung.edu/jallagan/Courses%20materials/Math%201450%20Calculus%201/Syllabus%20and%20ebook/TextBook%20Active%20Calculus.pdf>
- Supplemental material:
  - <http://faculty.ung.edu/jallagan/Courses%20materials/Math%201450%20Calculus%201/Syllabus%20and%20ebook/problems%20and%20solutions%20for%20calculus%201.pdf>
  - <https://en.wikibooks.org/wiki/Calculus> (Calculus Wiki-book)
  - <http://tutorial.math.lamar.edu> (Paul's Online Math Notes)
  - <http://archives.math.utk.edu/visual.calculus/> (Tutorial)
  - <http://www2.latech.edu/~schroder/animations.htm> (Animations)
  - <https://www.math.ucdavis.edu/~kouba/ProblemsList.html> (Tutorial)

## 2. Selected Student Feedbacks

- My experience using online materials this semester has been great. I like using the online textbook because it is at no cost and it really helped me out for having to buy all the other books for my other classes. The online text material gave really good examples and clear instructions on how to do the math that I was taking. The only thing that I disliked was there was one time where I could not access the book because of a technical difficulty; however, this did not last long. I would actually prefer an online text book for math class because it helps me pay attention better. I would not prefer an online one for a class such as literature, because if I were to have to read something like a story, I would rather have a textbook.
- This semester, instead of using a textbook, I was allowed to use online resources provided by the teacher. With this, I believe I have learned as much (and possibly more) from the Internet than I could have with a book.

However, because it is online, the only downside was that I had to have a computer to access the websites. But, because technology is available at my house and at the library, it was rarely a problem going to the online textbook.

Additionally, since we are allowed to use an online textbook, I saved an amazing amount of money. For some classes, an expensive textbook is required, but the students rarely use it. I do not believe that is anyone's fault, but it is very nice to not have to pay money for a textbook.

In conclusion, I believe having an online textbook is as efficient and possibly more than buying a textbook.

- Personally, I enjoyed having an online textbook and assignments. It took financial pressure off of me by not having to buy another book and it was very easily accessible. It was hard at times to use the online book to copy problems and such. I find it easier to do with a paper-back book. Overall, I would rather have an online textbook over a paperback.

### 3. Quantitative and Qualitative Measures

#### A. Pass, Fail, and Withdrawal (PFW) Expected Outcomes (*This expectation is projected mainly based on students' performances prior to Grant implementations*)

- Percent pass greater than or equal to:
  - Beginning (Foundations) & Intermediate Algebra 50 %
  - College algebra 60%
  - Pre-Calculus 60%
  - Calculus 1 54%
- Percent fail less than or equal to:
  - Beginning (Foundations) & Intermediate Algebra 35%
  - College Algebra 25%
  - Pre-Calculus 19%
  - Calculus 1 18%
- Percent withdrawn strictly less than:
  - Beginning (Foundations) & Intermediate Algebra 15 %
  - College Algebra 15%
  - Pre-Calculus 21%
  - Calculus 1 28%

#### **In the spring of 2015, compared to the projected Pass Fail and Withdrawal excepted outcomes:**

- The percentage of pass in:
  - Foundations and Intermediate Algebra shows a drop of 19%.
  - College Algebra shows a drop of about 2%.
  - Pre-Calculus is about the same
  - Calculus 1 shows a drop of about 7%
- The percentage of fail in:
  - Foundations and Intermediate Algebra shows an increase of 11%.
  - College Algebra shows a decrease of about 8%.
  - Pre-Calculus shows a decrease of about 2%
  - Calculus 1 shows a decrease of about 11%
- The percentage of withdrawal in:
  - Foundations and Intermediate Algebra shows an increase of 8%.
  - College Algebra shows an increase of 10%.
  - Pre-Calculus shows an increase of about 1%
  - Calculus 1 shows an increase of about 20%

## B. Students Overall Performance

Rubrics (**number** and **percentage** of students) for the **Pass/Fail and Withdrawal (PFW)** for Foundations and Intermediate Algebra, College Algebra, Precalculus and calculus

<b>Course Text Book</b>	<b>Semester Year</b>	<b>Total No. Stud./class Registered</b>	<b>Pass in %</b>	<b>Fail a grade of D or less in %</b>	<b>Withdraw in %</b>
<b>Beginning &amp; Intermediate Algebra</b>	Fall 2013	<b>109</b>	<b>64.2%</b>	<b>31.2%</b>	<b>4.6%</b>
	Spring 2014	<b>63</b>	<b>41.3%</b>	<b>46.0%</b>	<b>12.7%</b>
	Spring 2015 (Free OER)	<b>51</b>	<b>41.2%</b>	<b>39.2%</b>	<b>19.6%</b>
<b>Foundations &amp; Intermediate Algebra</b>	Fall 2015 (Free OER)	<b>75</b>	<b>30.7%</b>	<b>46.7%</b>	<b>22.7%</b>
<b>College Algebra</b>	Spring 2014	<b>31</b>	<b>67.7%</b>	<b>12.9%</b>	<b>19.4%</b>
	Fall 2014	<b>62</b>	<b>64.5%</b>	<b>27.4%</b>	<b>8.1%</b>
	Spring 2015 (Free OER)	<b>58</b>	<b>51.7%</b>	<b>29.3%</b>	<b>19.0%</b>
	Fall 2015 (Free OER)	<b>56</b>	<b>58.9%</b>	<b>16.1%</b>	<b>25%</b>
	Spring 2014	<b>62</b>	<b>58.1%</b>	<b>16.1%</b>	<b>25.8%</b>
	Fall 2014	<b>64</b>	<b>59.4%</b>	<b>31.2%</b>	<b>9.4%</b>
	Spring 2015	<b>64</b>	<b>59.4%</b>	<b>9.3%</b>	<b>31.3%</b>
	Fall 2015 (Free OER)	<b>23</b>	<b>60.9%</b>	<b>17.4%</b>	<b>21.7%</b>
<b>Calculus I</b>	Spring 2014	<b>31</b>	<b>71%</b>	<b>12.9%</b>	<b>16.1%</b>
	Fall 2014	<b>31</b>	<b>42%</b>	<b>16.1%</b>	<b>41.9%</b>
	Spring 2015	<b>30</b>	<b>50%</b>	<b>23.3%</b>	<b>26.7%</b>
	Fall 2015 (Free OER Combined)	<b>54</b>	<b>46.3%</b>	<b>5.6%</b>	<b>48.1%</b>

**C. Student survey feedback** using <https://forms.ung.edu/view.php?id=183960>

The main objective of the survey was to get some idea about:

- Student’s mathematics textbook expenses
- How students meet their financial expenses
- Student’s preference about books; hard copy (which always comes with a price tag) versus web based e-books which could come free of charge

**Fall 2015 survey** feedbacks collected from Foundations and Intermediate Algebra, College Algebra, Precalculus and calculus

Total number of students participated in the survey is **79**

Shown below are some results of the survey in **percent**:

Question	Yes	No
▪ Do you receive financial aid, which covers the cost of textbooks?	51%	48%

Question	Hard Copy Textbook	On-line Textbook
▪ Given the choice between using a required "hard" copy textbook which has a cost or using an "on-line" textbook which is free, I would prefer using	21.5%	77.22%

Question	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
▪ I would prefer using online course materials at no cost to me which would include the course textbook, practice sets, further infestations, etc. even though the sources may be contained on different websites on the Internet	3.8%	5.06%	11.39%	31.1%	48.1%
▪ I do not anticipate technical or access problems using online course materials.	3.8%	8.86%	27.85%	35.44%	24.05%

**4. Sustainability Plan**

- We will continue to offer Foundations, College Algebra, Pre-Calculus, and Calculus I courses currently taught by professors Allagan, Kidane , and Goodroe through the next academic year. We will also continue to update course materials and continually review on-line textbook options as appropriate.

## 5. Future Plans.

- We will consider creating on-line homework exercises using D2L(Desire to learn)
- In order to expand our ALG grant efforts, we note that our colleagues want the use of “Webassign” or “MyMathLab” for automatic grading of problem sets. Thus, there needs to be investigations done to determine the connection between on-line textbooks and publishers’ propriety math support tools.

## 6. Description of Photograph

From Left to Right: **John Williams, Michael Goodroe, Julian Allagan, and Berhanu Kidane**

