

Fall 2015

## College Algebra (University of North Georgia)

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# Grants Collection

University of North Georgia



UNIVERSITY SYSTEM  
OF GEORGIA



Michael Goodroe, Berhanu Kidane, Julian Allagan,  
John Williams

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# College Algebra

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## 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.



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# Syllabus

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**University of North Georgia**  
**College of Science and Mathematics**  
**Mathematics Department**  
**Mathematics 1111, College Algebra CRN 9076**

**Meeting Time:** 9:00 am – 9:50am MWF;   **Room:** O. Class 320  
**Semester:** Fall (2015)  
**Instructor:** Berhanu Kidane  
**Office:** Room 311B (Oconee)  
**Office Phone:** (706) 310 – 6363  
**E-Mail:** [berhanu.Kidane@ung.edu](mailto:berhanu.Kidane@ung.edu)

**Office Hours:**        MW    **11:00 – 12:00 pm**  
                             TR    **12:00 – 01:30 pm**  
                             Fri    **11:30 – 02:00 pm:** Room 320 (Math Gym)

**Important Dates:**

1. Course changes and late registration: Drop/Add: August 17 – 21
2. Full Session withdrawal Monday October 12  
Dropping a course after this date means an automatic "WF" unless the Dean gives specific approval. Prior to this date, a "W" will be awarded.
3. Holiday, Monday September 7 (no Class Labor Day):
4. Fall Break Monday Nov 23 - 27(no classes)
5. Class end: Friday, Dec 04; Final Exams (Dec 07 - 11)
6. **Final Exam: (Monday Dec 7 from 8:00 – 10:00)**

**Texts and Other Materials are available free online for students:**

1. **Online Educational Resources (OER)** from Affordable Learning Georgia (ALG): <http://www.affordablelearninggeorgia.org/>) and other online resources:

**Text Books, e – books**, students can download a free pdf copy:

- <http://www.stitz-zeager.com/szca07042013.pdf> (Main Text Book)
- <http://msenux.redwoods.edu/IntAlgText/> (Chapters 3 – 9 Supplementary Text )

**Tutorials and Practice Exercises**

- [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)
- <http://www.ixl.com/math/algebra-2>
- <http://www.ixl.com/math/precalculus>
- <http://www.ltconline.net/green/java/index.html>

2. **Technology Resources**

- Desmos Graphic Calculator at <https://www.desmos.com/calculator>
- Graphing calculator, Calculator-Based Laboratory (CBL), Calculator-Based Ranger (CBR)

3. **Web-based Resources**

- Khan academy at: <http://www.khanacademy.org>
- **Google** at: <http://www.google.com> Google any topic (**For example:** Google Square root of 2 or pi or any topic)
- You tube at: <http://www.youtube.com> (**For example:** write “linear equations” in the YouTube.com browser bar)

4. **COURSE DESCRIPTION:**

Topics include algebraic and absolute value equations and inequalities; piece-wise defined, polynomial, rational, exponential and logarithmic functions with their graphs and applications; and systems of equations. This course is designed to prepare students for MATH 1113 or MATH 2040. Students in majors that do **not** require these courses are encouraged to take MATH 1001 or MATH 1101.

**Credit:** 3 hours. **Prerequisite:** Regular placement or successful completion of MATH 0099.

**Co-requisite:** READ 0099, unless exempt

## 5. COURSE OBJECTIVES:

After completion of the course the student will be:

- Prepared for further work in mathematics.
- Able to Represent and solve real-world problems and applications of mathematics.
- Exposed to technology that enhances understanding of mathematics.
- Able to apply the distance and midpoint formulas.
- Able to graph and find the equation of a circle in standard form.
- Able to apply a variety of problem solving strategies including algebraic, numerical, and graphical techniques to analyze and/or solve piece-wise defined, polynomial, rational, and absolute value equations and inequalities.
- Able to apply function concepts and notation including function composition and inverse function.
- Able to set up and solve variation problems.
- Able to identify polynomial functions and perform sums, products, and quotients of polynomials (including the Remainder and Factor Theorems.)
- Able to identify rational functions, find the domain of a rational function, find asymptotes and sketch graphs
- Able to apply a variety of problem solving strategies including algebraic, numerical, and graphical techniques to solve exponential and logarithmic functions.
- Able to solve and classify systems of linear equations.

## 6. General outline for course coverage based on the 50 minute class duration.

- Equations, Inequalities and Variation: 8 days
- Coordinates and Graphs: 4 days
- General Functions: 7 days
- Polynomial and Rational Functions: 7 days
- Exponential and Logarithmic functions: 7 days
- Systems of Equations: 3 days

## 7. COURSE CONTENTS AND COVERAGE

	Dates	No of Weeks
<b>Chapter 1: Sets and The Real Number System (P. 1 – 17 )</b>		
1.1.0. Sets		1
1.1.1. Review on the Real Number System		
1.1.2. The Coordinate and Graphs		2&1/2
1.1.3. The Coordinate Plane and Graphs		
2.4. Solving Equations and Inequalities (P. 208)		
<b>1.2 – 1.7. Relations, Functions and Their Graphs (P. 20 – 144)</b>		3&1/2
1.2. Relations		
1.3. – 1.7. Functions and Properties, Basic Functions;		
Getting Information from Graphs		
Average and Instantaneous Rate		
Graphing Techniques: Transformations		
<b>Chapter 5. Further Topics on Functions (P. 359 – 411)</b>		
5.1 Combining Functions		
5.2 One to one Functions and Their Inverses		
<b>Chapter 2&amp; 3. Polynomial Functions (P. 151 – 297)</b>		4
2.1. – 2.2. Linear, Quadratic Functions and Models (P. 151 – 203)		
3.1. – 3.4. Polynomial Functions and Their Graphs (P. 235 – 297)		

Dividing Polynomials		
Real Zeroes of Polynomials		
Complex Zeroes of Polynomials		
<b>Chapter 4. Rational Functions (P. 301 – 353)</b>		
4.1 – 4.3. Rational Functions and Graphs		
<b>Chapter 6. Exponential and Logarithmic Functions (P. 417 – 490)</b>		2
6.1. – 6.3. Exponential Function		
6.2. – 6.4. logarithmic Functions and Laws		
<b>Chapter 8. Systems of Equations and Inequalities (P 549 – 566)</b>		1
8.1. System of Linear Equations in Two variables		
System of Linear Equations in Several Variables		

## 8. METHODS

- i. **Methods of Instruction:** The methods of instruction are determined by the instructor; however, the instructor is encouraged to use a variety of methods. These methods may include, but are not limited to lecture; problem-solving sessions with informal assessment by the student or instructor; discussion; group projects; timely feedback from test, quiz, or project results (formative assessment); question and answer; computer or calculator based explorations; and student presentations. Students will be encouraged to assess and monitor their own problem-solving process to determine when an error has been made or a new strategy should be used.
- ii. **Evaluation Methods:** Formative assessment will be in the form of written tests and/or short quizzes and summative assessment will be in the form of a final examination. Special projects and daily grades may be used at the discretion of the instructor. Final grades are determined by the percentage as follows:  
**90 – 100 = A, 80 - 89 = B, 70 – 79 = C, 60 – 69 = D and below 60 = F.** (Although a grade of "D" is passing, you must have a "C" or better in MATH 1111 to take any course for which MATH 1111 is a prerequisite.)

## 9. OTHERS:

- **Tests and other assignments:** In class or Take-Home Quizzes (Homework), Four Exams/Tests (of the Four one with the least grade will be dropped)
- **Final:** The final is comprehensive, covers everything discussed during the semester
- **Make-up Information:** Generally Make-ups are not allowed for missed Tests; however, if a student provides an acceptable authorized documentation for the absence, the student might be allowed to make up for the missed work. No make-up for homework and no make ups for missed classes.
- **Attendance Policy:** The attendance policy is concurrent with UNG's attendance policy. Attendance will be taken each class.
- **Student Grade Calculator:** An excel spread sheet **student grade calculate** will be posted in the **shared class files**. Students are responsible for calculating their up to date grades using the grade calculator.

## 10. FINAL GRADES:

Final grades will be determined as follows:

Homework and Quiz:	30 pts.	
Exam/Test One:	15 pts.	(September 9)
Exam/Test Two:	15 pts.	(September 30)
Exam/Test Three:	15pts.	(October 28)
Exam/Test Four:	15 pts.	(November 18)
Final Exam:	25 pts.	(Monday Dec 7 from 8:00 – 10:00)
Total:	100	

- ❖ *The instructor reserves the right to alter the syllabus, in whole or in part, in order to meet the needs of all the students*

## 11. SUPPLEMENTARY MATERIALS:

### i. Library Resources:

- Mathematics Teacher, NCTM, Reston, VA.
- Schaum's easy outlines. *College algebra* : based on Schaum's Outline of *college algebra* by Murray R. Spiegel and Robert E. Moyer [computer file] / abridgement editor, George J. Hademenos
- Bell, E. T. Men of Mathematics. New York: Simon & Schuster, 1937.
- Osen, Lynn. Women in Mathematics. Cambridge MA, MIT Press, 1974.

ii. **Optional Books:** Any college Algebra or pre-calculus book of **any edition** whose contents overlap the contents on page 3 of this syllabus can serve as a reference for this course. For Example: College Algebra by John Colburn; College Algebra by Michael Sullivan; College Algebra by Margaret Lial and John Hornsby; College Algebra by James Stewart and Lothar Redlin; College Algebra by Robert Blitzer etc.

### iii. Other Web-based Resources:

- Purplemath.com at: <http://www.purplemath.com>
- Project Interactive - <http://www.shodor.org/interactivate>
- Association for Women in Mathematics – <http://www.awm-math.org>
- The Math Forum - <http://mathforum.org/>
- Texas Instruments - <http://education.ti.com/educationportal>
- Eric Weisstein's World of Mathematics (Encyclopedia of Mathematics) - <http://mathworld.wolfram.com>
- Math Nerds – <http://www.mathnerds.com/mathnerds>
- SOS Mathematics – <http://www.sosmath.com>
- Multi cultural Pavillon - <http://www.edchange.org/multicultural>
- Women in Mathematics - <http://www.agnesscott.edu/lriddle/women/women.htm>
- Careers in Mathematics - <http://www.ams.org/early-careers/>



## **SUPPLEMENTARY SYLLABUS**

Students are expected to refer to the Supplemental Syllabus, given below, for other detailed instructions which include in addition to disability services, the following:

1. **Academic Exchange**
2. **Academic Integrity Policy**
3. **Academic Success Plan Program**
4. **Class Evaluations**
5. **Course Grades and Withdrawal Process**
6. **Disruptive Behavior Policy**
7. **Inclement Weather**
8. **Smoking Policy**
9. **Students with Disabilities**

### **ACADEMIC SUCCESS PLAN PROGRAM**

UNG has implemented an Academic Success Plan Program to identify and provide assistance to at-risk students. Refer you to your campus Academic Advising Center for the development of strategies that will enhance your academic success. You will be expected to take advantage of advising and other campus resources to achieve your academic goals.

### **STUDENTS WITH DISABILITIES**

University of North Georgia is committed to equal access to its programs, services, and activities, and welcomes otherwise qualified students with disabilities. Students who require accommodations and services must register with Disability Services and submit supporting documentation. Disability Services provides accommodation memos for eligible students to give to their instructors. Students are responsible for making arrangements with instructors, and must give reasonable prior notice of the need for accommodation.

### **Contact Information for Disability Services:**

- Gainesville Campus: Carolyn Swindle, Assistant Director, [carolyn.swindle@ung.edu](mailto:carolyn.swindle@ung.edu), Dunlap-Mathis Building, Room 107, 678-717-3855
- Dahlonega Campus: Thomas McCoy, Assistant Director, [thomas.mccoy@ung.edu](mailto:thomas.mccoy@ung.edu), Stewart Student Success Center, Room 313, 706-867-2782.
- Oconee Campus: Erin Williams, Assistant Director, [erin.williams@ung.edu](mailto:erin.williams@ung.edu), Administration Building, Room 112, 706-310-6202.
- Cumming Instructional Site: Nicola Dovey, Director [nicola.dovey@ung.edu](mailto:nicola.dovey@ung.edu) or Beth Bellamy, Test Facilitator, [beth.bellamy@ung.edu](mailto:beth.bellamy@ung.edu) 678-717-3855. (For on-site assistance, contact Rebecca Rose, Head Librarian, [rebecca.rose@ung.edu](mailto:rebecca.rose@ung.edu), Library University Center 400, 470239-3119.

### **ACADEMIC INTEGRITY POLICY**

**Student Code of Conduct:** Please review the Student Code of Conduct found here: <http://ung.edu/student-affairs/student-code-of-conduct.php>

**Plagiarism and Turnitin.com:** Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Terms and Conditions of Use posted on the Turnitin.com site.

**Copyright:** Both Federal and State laws forbid the unlawful duplication of copyrighted computer software or other reproductions of copyrighted material. In accordance with these policies, University of North Georgia expressly forbids the copying of such materials supplied by or used in the College. Unlawful duplication of copyrighted materials by a user may result in disciplinary action by the College under the Student Code of Conduct (Non-Academic Infractions--Prohibitions, Theft), and/or possible criminal action by the owner of the copyright.

### **DISRUPTIVE BEHAVIOR POLICY**

Students who exhibit behaviors that are considered to obstruct or disrupt the class or its learning activities are subject to sanctions under the Board of Regents Policy on Disruptive Behavior. Behaviors which may be considered to be inappropriate in this classroom includes, but is not limited to, sleeping, coming in late, talking out of turn, inappropriate use of laptops or mobile devices, verbal behavior that is disrespectful of other students or the faculty member, or other behaviors that may be disruptive. Students who exhibit such behavior may be temporarily dismissed from the class by the instructor and will be subject to disciplinary procedures outlined in the Student Handbook.

### **CLASS EVALUATIONS**

Class evaluations at UNG are conducted online. Evaluation of the class is considered a component of the course and students will not be permitted to access their course grade until the evaluation has been completed. The evaluations will be accessible beginning one week prior to Final Exam week.

### **ACADEMIC EXCHANGE**

Universities welcome diversity, free speech and the free exchange of ideas. Discussion should be held in an environment characterized by openness, tolerance of differences and civility. The values of an intellectual community are trust, honesty, free inquiry, open debate, respect for diversity, and respect for others' convictions. Further, the intellectual community always seeks to foster the virtues and characteristics of intelligence, curiosity, discipline, creativity, integrity, clear expression, and the desire to learn from others. It is these that must guide our work and exchanges in this class. These principles are delineated further in the [ACE Statement on Academic Rights and Responsibilities](#).

If these values and principles are breached, students have the right and responsibility to discuss their concerns with the course instructor and, as needed, the department head. Usually, the concerns are addressed at this level, but sometimes the department head may refer students to another resource. In the event that either the student or the instructor is not satisfied after discussion with each other, he/she may take his/her concerns in writing to the Associate Provost for Academic Administration.

### **INCLEMENT WEATHER**

TV and radio stations will announce if the college is closed. Information on closing will also be available on our Web site <http://www.ung.edu>. Students, faculty and staff who have registered under Blackboard Connect Emergency Notification System will receive information not only about college and individual campus closures but also about the status of college and campus hours, including late openings.

### **Blackboard Connect Emergency Notification System**

Emergency situations - from natural disasters to health scares to the threats of violence - require that our campus community be fully prepared and informed. Accordingly, University of North Georgia has implemented the Blackboard Connect service to enhance university communication and emergency preparedness. The Blackboard Connect system is a communication service that enables key administrators and Public Safety personnel to quickly provide all students, faculty, and staff with personalized voice and text messages.

All UNG emails are added into the system automatically. In addition, you may enter a phone number so that emergency announcements can be sent to you via voice and text message. To do this, go to our Banner self-service environment; click on the tab labeled "Personal Information"; then, click on the tab named "Enter Emergency Contacts for Blackboard Connect." Here you can update your information for the Blackboard system.

If you have questions, please contact Public Safety at 706-864-1500 or send an e-mail to [emeralert@ung.edu](mailto:emeralert@ung.edu).

## **COURSE GRADES AND WITHDRAWAL PROCESS**

**Grades: A, B, C, D, F, W, WF, MW** – Should this date be listed at the end of this section?

**Incomplete grades (I)** - This grade indicates that a student was doing satisfactory work but, for non-academic reasons beyond her/his control, was unable to meet the full requirements of the course. For undergraduate programs, if an **I** is not satisfactorily removed after one semester (excluding summer), the symbol of **I** will be changed to the grade of **F** by the appropriate official. For graduate programs, if an **I** is not satisfactorily removed after two semester (excluding summer), the symbol of **I** will be changed to the grade of **F** by the appropriate official. Under special circumstances, this period of time can be increased with the approval of the department head and the dean.

**IP (In Progress)** - This grade is appropriate for thesis hours, project courses, Learning Support and English as a Second Language (**ESL**) courses. It is not appropriate for traditional credit courses. If an **IP** grade isn't satisfactorily removed after 3 semesters, the symbol of **IP** will be changed to the grade of **F** by the appropriate official. Under special circumstances, this period of time can be increased with the approval of the dean. However, students who receive a grade of **IP** in a learning support course or an **ESL** will retain this grade due to the nature of the course.

**K** – This symbol indicates that a student was given credit for the course via a credit by examination program.

**MW** – Withdrawal for military exigencies.

**CR** – Credit (for Military experience).

**NR** – This symbol indicates that the grade was not reported by the instructor.

**S** – This symbol indicates that a student completed the course with satisfactory work.

**U** – This symbol indicates that a student did not complete the course with satisfactory work.

**V** – This symbol indicates that a student was given permission to audit the course. Students may not transfer from audit to credit status or vice versa. If an audit student withdraws from a course prior to the end of the term, a "**W**" will be assigned as the grade rather than a grade of "**V**". An audit student who is dropped by the instructor for excessive absences will be assigned a grade of "**W**".

**W** or **WF** – A **W** grade indicates that a student was permitted to withdraw from without academic penalty. Students may withdraw from courses prior to the midterm and receive a grade of **W**. Withdrawals without penalty will not be permitted after the midpoint of the total grading period except in cases of hardship as determined by the appropriate official. If a student withdraws before the deadline, the grade of **W** will be given. The grade of **WF** is for students who withdraw after the deadline for the term or commit academic integrity violations.

### **Link for Supplemental Syllabus:**

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

# Initial Proposal

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**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

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# 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**

