Summer 2017

Introductory Physics I & II (MGA)

Edwynn Wallace
Middle Georgia State University, edwynn.wallace@mga.edu

Malav Shah
Middle Georgia State University, malav.shah@mga.edu

Grants Collection
Middle Georgia State University

UNIVERSITY SYSTEM OF GEORGIA

Edwynn Wallace & Malav Shah

Introductory Physics I & II

Affordable Learning Georgia

Georgia's Virtual Library GALILEO
An Initiative of the University System of Georgia

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.

Initial Proposal

Application Details

Manage Application: ALG Textbook Transformation Grant

Award Cycle:	Round 4
Internal Submission Deadline:	Monday, September 7, 2015

Application Title:	175
Submitter First Name:	Barbara
Submitter Last Name:	Ratzlaff
Submitter Title:	Director Contracts and Grants
Submitter Email Address:	barbara.ratzlaff@mga.edu
Submitter Phone Number:	478.471.5353
Submitter Campus Role:	Grants Office
Applicant First Name:	Edwynn
Applicant Last Name:	Wallace
Applicant Email Address:	edwynn.wallace@mga.edu
Applicant Phone Number:	478.934.3146
Primary Appointment Title:	Associate Professor of Physics
Institution Name(s):	Middle Georgia State University

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Edwynn Wallace, Associate Professor of Physics, edwynn.wallace@mga.edu

Malav Shah, Associate Professor of Physics, malav.shah@mga.edu

Sponsor, (Name, Title, Department, Institution):

Martha Venn, PhD, Provost, Academic Affairs, Middle Georgia State University

Proposal Title: 175

Course Names, Course Numbers and Semesters Offered:

Introductory Physics I: PHYS 1111K. Offered Fall 2015, Spring 2016, Summer 2016, Fall 2016, Spring 2017

Introductory Physics II: PHYS 1112K. Offered Spring 2016, Summer 2016, Spring 2017

Final Semester of Instruction:	Spring 2017
Average Number of Students per Course Section:	24
Number of Course Sections Affected by Implementation in Academic Year:	9
Total Number of Students Affected by Implementation in Academic Year:	216
List the original course materials for students (including title, whether optional or required, & cost for each item):	Physics: Principles with Applications with e-text and MasteringPhysics Access Code, Giancoli, 7th ed., Required, $289.60 Physics Laboratory Experiments, Wilson, 7th ed., Required, $218.95
Proposal Categories:	OpenStax Textbooks
Requested Amount of Funding:	$10,800
Original per Student Cost:	$508.55
Post-Proposal Projected Student Cost:	$23.00
Projected Per Student Savings:	$485.55
Plan for Hosting Materials:	D2L

Project Goals:

- Significantly lower the cost of student materials in the PHYS 1111/1112K Introductory Physics I and II sequence.
- Improve student course retention.
- Improve or maintain student learning in the sequence.
- Improve or maintain student course satisfaction.

Statement of Transformation:

As an open access institution, Middle Georgia State University serves a diverse population of students. Many of these students are from backgrounds that are underrepresented in STEM fields and have limited financial flexibility.

This transformation will decrease the costs to these students through adopting the free online textbook from OpenStax College, College Physics by Urone and Hinrichs, for the Introductory

Physics (trigonometry-based) sequence. Along with changing the textbook, a lower cost online homework system, WebAssign, will be adopted to replace the current system. Another cost reduction is to replace the laboratory text with no-cost-to-student laboratory exercises. These actions would reduce the cost per student by $486.

The most important stakeholders in this transformation are the students that take the Introductory Physics sequence. The course rosters are mostly comprised of Biology majors working toward careers in the STEM fields, medicine, pharmacy, or allied health occupations. With the addition of students taking these courses as electives, this project would lower the cost to approximately 200 students per academic year.

Physics is a constructive subject where the foundations are laid in the first few weeks. These foundational principles are built upon continuously throughout the two course sequence. Student who do not buy or cannot afford the course materials at the beginning of the semester find themselves at a distinct disadvantage. Many of them withdraw or fail the course. Free and low cost materials would remove this barrier and permit these students to move forward with their education. This transformation should increase student success in the course and improve graduation and retention rates for the University while significantly lowering the costs of education to students.

Transformation Action Plan:

- The OpenStax text, College Physics, will need to be reviewed to verify that it meets course and instructor learning outcomes. Supplementary material my need to be added or developed if some outcomes are not met.
- Course syllabi including content schedule will be adapted to accommodate the new textbook.
- Lecture presentations, test questions, and assignments will be adjusted to use College Physics.
- Homework assignments will be redesigned using the WebAssign homework system.
- Using existing equipment, no-cost-to-student laboratory exercises will be implemented to replace the expensive laboratory text.
- A student opinion survey of the textbook will be developed and distributed to students taking the course.
- Student course retention, student learning, and student course satisfaction will be assessed and compared to earlier data.

Both Edwynn Wallace and Malav Shah will work as subject matter experts and instructional designers. They will collaborate in the redesign of the physics sequence as well as implement the changes in their respective classes. Both team members will attend the kick-off training meeting in October and complete status and final project reports.

Links to the OpenStax textbook, online homework system, and laboratory printouts will be available to students via Brightspace/D2L.

Any developed material will be made available to the public via individual team member

University hosted websites.

Quantitative & Qualitative Measures:	Drop, withdraw, and fail (DFW) rates will be collected from previous semesters and compared to DWF rates after implementation. The Force Concept Inventory and the Conceptual Survey in Electricity and Magnetism will be administered to students as a pre/post test to measure student learning. The normalized gain will be compared to previous semesters. Student Evaluation of Faculty questionnaire quantitative results will be compared to previous results for each instructor to measure student course satisfaction. Qualitative results from student comments on the evaluations will also be examined. A student opinion survey of the textbook will be developed and administered to measure student response to the OpenStax textbook.

Timeline:

Fall Semester 2015:

- Review the OpenStax text and identify topics that may need supplementary material.
- Evaluate current syllabi and decide what changes need to be made.
- Begin adjustments of lecture presentations, test questions, and assignments.
- Begin to create homework assignments in Web Assign.
- Identify gaps in laboratories not covered by current no cost to student material and begin to investigate or design replacement exercises.

Spring Semester 2016:

- Finalize all changes to the course sequence including syllabi, course materials, homework assignments, and laboratories.
- Develop the student opinion survey of the textbook.

Summer Semester 2016:

- Offer courses over the summer to test modifications and make adjustments.

Fall 2016 and Spring 2017 Semesters:

- Fully implement course sequence transformation.

Budget:

$5000 Overload Pay for Edwynn Wallace, Subject Matter Expert and Instructional Designer

$5000 Overload Pay for Malav Shah, Subject Matter Expert and Instructional Designer

$800 for Miscellaneous Expenses and Travel

Total Expenditures: $10,800

Sustainability Plan:

There are no additional costs to maintain the transformation of the Introductory Physics sequence. The OpenStax textbook and Web Assign should continue to be available for many years. Additional materials will be housed on D2L which is maintained by the University System. The no-cost-to-student laboratory exercises will be adjusted as equipment and needs change. Any supplementary material developed during the transformation will be made available to the public via individual team member University hosted websites.

Middle Georgia
State University

Office of the Provost
100 College Station Drive, Macon, GA 31206
478.471.2730 mga.edu

Macon
Cochran
Dublin
Eastman
Warner Robins
and online everywhere

September 3, 2015

To Whom It May Concern:

From: Dr. Marti Venn, Provost
Middle Georgia State University

RE: Letter of Support for Affordable Learning Georgia Award 2015-2016

I am pleased to provide this letter of support for Dr. Edwynn Wallace and Mr. Malav Shah's proposal from the Department of Natural Sciences to transform the introductory sequence in Physics I (PHYS 1111K) and Physics II (PHYS 1112K). The first course is taught all three semesters (Fall, Spring and Summer) and the second sequence course is taught two semesters (Spring and Summer). Over 70% of Middle Georgia State College students are on financial aid and could not afford to come to college without that support. Currently students pay $486.00 for the sequence of course in textbook and laboratory experiments. If this project is funded the costs for students will only be $23.00! This is a significant savings to our students. This RFP dovetails well with our University core values of "stewardship" and "adaptability" and to serve our students in new and transformative ways while reducing student debt. My office is committed to sustainability of this project after this year. Through our Center for Teaching Innovation we can provide faculty professional development to transform these courses. If funded, my office stands ready to support, champion, and publically recognize the work of the School of Education and USG Affordable Learning Georgia Funding!

Syllabus

PHYS 1111K - Introductory Physics I: Course Content and Tentative Schedule

Textbook: College Physics, Urone and Hinrichs, by OpenStax

Date:	Material:	Sections:
Week 1: Day 1	Introduction https://cnx.org/contents/Ax2o07Ul@9.77:HR_VN3f7@3/Introduction-to-Science-and-th	1:1 – 4
Day 2	Kinematics https://cnx.org/contents/Ax2o07Ul@9.77:4SMp5I1s@2/Introduction-to-One-Dimensiona	2: 1 – 4, 8
Week 2: Day 1	Kinematics Continued	2: 5 – 7
Day 2	Two Dimensional Kinematics: https://cnx.org/contents/Ax2o07Ul@9.77:8wmg-WP7@3/Introduction-to-Two-Dimensiona	3: 1 – 3
Week 3: Day 1	Two Dimensional Kinematics Continued	3: 4 - 5
Day 2	Dynamics - Force and Newton's Laws https://cnx.org/contents/Ax2o07Ul@9.77:AvUqAiSE@5/Introduction-to-Dynamics-Newto Review for Test #1	4: 1 – 4
Week 4: Day 1	**Test#1: Kinematics and 2-D Kinematics**	
Day 2	Dynamics - Force and Newton's Laws Continued	4: 5 – 8 (5:1)
Week 5: Day 1	Further Applications of Newton's Laws https://cnx.org/contents/Ax2o07Ul@9.77:lyM8iHiR@2/Introduction-Further-Applicati	5: 1 – 3
Day 2	Uniform Circular Motion and Gravitation https://cnx.org/contents/Ax2o07Ul@9.77:PvXftgqN@2/Introduction-to-Uniform-Circul	6: 1 – 3
Week 6: Day 1	Uniform Circular Motion and Gravitation Continued	6: 4 – 6
Day 2	Work, Energy, and Energy Resources	7: 1 – 5

	https://cnx.org/contents/Ax2o07Ul@9.77:ZDtuSt4h@2/Introduction-to-Work-Energy-an Review for Test #2	
Week 7: Day 1	**Test #2: Newton's Laws and Uniform Circular Motion**	
Day 2	Work, Energy, and Energy Resources Continued	7: 6 – 9
Week 8: Day 1	Linear Momentum and Collisions https://cnx.org/contents/Ax2o07Ul@9.77:Zyl5ofSl@3/Introduction-to-Linear-Momentu	8: 1 – 4
Day 2	Linear Momentum and Collisions Continued	8: 5 – 6
Week 9: Day 1	Rotational Motion https://cnx.org/contents/Ax2o07Ul@9.77:iYslgv4G@4/Introduction-to-Rotational-Mot https://cnx.org/contents/Ax2o07Ul@9.77:EarCWlUd@4/The-Second-Condition-for-Equil Review for Test #3	10: 1 – 3, 9: 2
Day 2	**Test #3: Energy and Linear Momentum**	
Week 10: Day 1	Rotational Motion Continued	10: 4 – 5
Day 2	Rotational Motion Continued and Statics https://cnx.org/contents/Ax2o07Ul@9.77:Vpx1oNLV@4/Introduction-to-Statics-and-To	10: 7, 9: 1, 3 – 5
Week 11: Day 1	Statics Continued and Fluid Statics https://cnx.org/contents/Ax2o07Ul@9.77:g5mux1l3@3/Introduction-to-Fluid-Statics	9: 6, 11: 1-4
Day 2	Fluid Statics Continued and Review for Test #4	11: 5 – 9
Week 12: Day 1	**Test #4: Rotational Motion and Statics**	
Day 2	Fluid Dynamics https://cnx.org/contents/Ax2o07Ul@9.77:Y3wj6FHT@3/Introduction-to-Fluid-Dynamics	12: 1 – 4 (5 – 7)

Week 13: Day 1	Oscillatory Motion and Waves https://cnx.org/contents/Ax2o07Ul@9.77:Ix23ckjc@3/Introduction-to-Oscillatory-Mo	16: 1 – 6
Day 2	Oscillatory Motion and Waves Continued	16: 7 – 11
Week 14: Day 1	Physics of Hearing https://cnx.org/contents/Ax2o07Ul@9.77:N3j76YvP@3/Introduction-to-the-Physics-of Review for Test #5	17: 1 – 3, 5
Day 2	**Test #5: Fluids, Oscillatory Motion, and Waves**	
Week 15: Day 1	Physics of Hearing Continued	15: 4, 6 – 7
Day 2	Review for Final Exam	
Final Exam Including Physics of Hearing		

PHYS 1112K - Introductory Physics II: Course Content and Tentative Schedule

Textbook: College Physics, Urone and Hinrichs, by OpenStax

Date:	Material:	Sections:
Week 1: Day 1	Introduction and Review of Physics I	
Day 2	Temperature, Kinetic Theory, & Gas Laws https://cnx.org/contents/Ax2o07Ul@9.77:YFt95DxR@3/Introduction-to-Temperature-Ki	13: 1 - 3
Week 2: Day 1	Temperature, Kinetic Theory, & Gas Laws Continued	13: 4 - 6, 14:1-2
Day 2	Heat and Heat Transfer Methods https://cnx.org/contents/Ax2o07Ul@9.77:eJLN3YM-@3/Introduction-to-Heat-and-Heat-	14: 3 - 7
Week 3: Day 1	Thermodynamics https://cnx.org/contents/Ax2o07Ul@9.77:0m3DW_eU@4/Introduction-to-Thermodynamics	15: 1 - 3
Day 2	Thermodynamics Continued	15: 4 - 7
Week 4: Day 1	Electric Charge and Electric Field https://cnx.org/contents/Ax2o07Ul@9.77:mbRj4L0x@3/Introduction-to-Electric-Charg Review for Test #1	18: 1 - 4
Day 2	**Test #1: Kinetic Theory and Thermodynamics**	
Week 5: Day 1	Electric Charge and Electric Field Continued	18: 5 - 8
Day 2	Electric Potential https://cnx.org/contents/Ax2o07Ul@9.77:VSd7m2xj@4/Introduction-to-Electric-Poten	19: 1 - 4
Week 6: Day 1	Electric Potential Continued	19: 5 - 7
Day 2	Electric Current, Resistance, & Ohm's Law https://cnx.org/contents/Ax2o07Ul@9.77:En9j99Z_@3/Introduction-to-Electric-Curre	20: 4 - 7

	Review for Test #2	
Week 7: Day 1	**Test #2: Electric Fields and Potentials**	
Day 2	Circuits and DC Instruments https://cnx.org/contents/Ax2o07Ul@9.77:E74qWTpP@5/Introduction-to-Circuits-and-D	21: 1 - 3
Week 8: Day 1	Circuits and DC Instruments Continued	21: 4 - 6
Day 2	Magnetism https://cnx.org/contents/Ax2o07Ul@9.77:UIsk7BfH@2/Introduction-to-Magnetism Review for Test #3	22: 1 - 5
Week 9: Day 1	**Test #3: Electric Currents and Circuits**	
Day 2	Magnetism Continued	22: 6 - 11
Week 10: Day 1	Electromagnetic Induction https://cnx.org/contents/Ax2o07Ul@9.77:CUFax4cV@5/Introduction-to-Electromagneti	23: 1 - 6
Day 2	Electromagnetic Induction Continued	23: 7 - 12
Week 11: Day 1	Electromagnetic Waves https://cnx.org/contents/Ax2o07Ul@9.77:2dO6Gqcp@3/Introduction-to-Electromagneti Review for Test #4	24: 1 - 4
Day 2	**Test #4: Magnetism and Electromagnetic Induction**	
Week 12: Day 1	Geometric Optics https://cnx.org/contents/Ax2o07Ul@9.77:itIvTSi4@2/Introduction-to-Geometric-Opti	25: 1 - 5
Day 2	Geometric Optics Continued	25: 6 - 7
Week 13: Day 1	Wave Optics https://cnx.org/contents/Ax2o07Ul@9.77:F4SwR6oI@3/Introduction-to-Wave-Optics	27: 1 - 8

Day 2	Special Relativity https://cnx.org/contents/Ax2o07Ul@9.77:c3LUpAha@5/Introduction-to-Special-Relati Review for Test #5	28: 1 - 3
Week 14: Day 1	**Test #5: Electromagnetic Waves and Optics**	
Day 2	Special Relativity Continued	28: 4 - 6
Week 15: Day 1	Quantum Physics https://cnx.org/contents/Ax2o07Ul@9.77:vXY8BYJg@2/Introduction-to-Quantum-Physic	29
Day 2	Atomic Physics https://cnx.org/contents/Ax2o07Ul@9.77:BSCCZiN0@2/Introduction-to-Atomic-Physics	30: 1 - 9
Final Exam Including Relativity and Quantum Mechanics		

Department of Natural Sciences

Introductory Physics I Syllabus

Course (CRN): PHYS 1111K (25211) **Credit Hours**: 4 h
Semester (Campus): Spring 2017 (Cochran) **Revision Date**: 6 Jan 2017
Lecture Times: MW - 2:00pm - 3:15pm **Lecture Location:** Dillard Hall 104

Laboratory (CRN): PHYS 1111L (25212)
Laboratory Time: M - 3:30pm - 5:20pm **Laboratory Location:** Dillard Hall 103

Instructor Information

Instructor: Mr. Edwynn Wallace
Email: edwynn.wallace@mga.edu
Office: Dillard Hall 106
Office Phone: 478) 934 – 3146

Office Hours:

MTWR:	8:30am – 9:30am
M:	10:45am - 12:45pm
W:	3:15pm – 5:15pm

Course Information

Prerequisites: MATH 1112 or MATH 1113 **Corequisites:** PHYS 1111L

Course Description:

This introductory course will include material from mechanics, waves and may include thermodynamics. Knowledge of Algebra and Trigonometry will be required.

Student Learning Outcomes:

1. Demonstrate knowledge and understanding of the principles of kinematics, dynamics, work & energy, momentum & collisions, rotational motion, statics, and oscillations & waves.
2. Solve problems in physics using the principles of physics, mathematics including trigonometry, and multiple representations of physical systems.
3. Use various types of data collection tools for the experimental investigation of physical laws.

Required Texts: *College Physics, by OpenStax College*

Equipment: Scientific calculator ($10)**, WebAssign account,** and writing materials.

Additional Requirements: Internet Access, MGA E-mail Account

Class Policies

Attendance: Students whose number of absences is more than twice the number of class meetings per week may be assigned a failing grade for the course at the discretion of the instructor. Students who have more absences than the number of class meetings per week but less than twice the number of class meetings per week may be penalized at the discretion of the instructor. Students who have absences which are less than or equal to the number of class meetings per week will not be penalized.

If a student misses five of more class meetings, he/she will receive a failing grade for the course. Excused absences will not be counted.

Behavior: **The primary expectations of all Middle Georgia State University students are integrity and civility**. Each student should approach his/her academic endeavors, relationships, and personal responsibilities with a strong commitment to personal integrity and interpersonal civility. A full description of these responsibilities is found in the Student Handbook. (A full description of these responsibilities is found in the Student Handbook)

Misconduct: As a Middle Georgia State University student and as a student in this class, you are responsible for reading, understanding, and abiding by the MGSC Student Code of Conduct. The Student Code of Conduct is included in the *MGSC Student Handbook* and is available online at:

http://www.mga.edu/student-affairs/docs/MGSC_Student_Handbook.pdf

Cheating and plagiarism are serious violations and will not be tolerated! Cheating includes any attempt to defraud, deceive, or mislead the instructor in arriving at an honest grade assessment. Plagiarism is a form of cheating that involves presenting another's work or ideas as one's own.

All portions of any assignment, test, or final exam submitted by a student must be that student's work. Individual reports from collaborative projects must be the individual's own work and not copied from other group members. Specific requirements will be described for collaborative projects, but all work presented must be the work of members of that group. Research materials used must be properly cited.

Violation of the Academic Misconduct Policy will result in a grade of zero for that test, project or exam.

The following will be considered cheating in addition to any other academic misconduct unlisted:

- Open possession of a cell phone or any other communication electronics (including music players) during a quiz, test, or exam.
- Use of a computer during a quiz, test, or exam for any reason unless authorized by the instructor.
- Notes pertaining to the course, including those entered into a programmable calculator, found during a test or exam.
- Using past quizzes, tests, or exams for this course from any instructor without the permission of the current course instructor.
- Revealing any knowledge about a quiz, test, or exam to anyone in any section of the course that has yet to take that quiz, test, or exam.

Disabilities: Students seeking academic accommodations for a special need must contact Middle Georgia State University Office of Disability Services in Macon at (478) 471-2985 or in Cochran at (478) 934-3023. Students may also visit the Disability Services Office in room 266 of the Student Life Center on the Macon campus or in Sanford Hall on the Cochran campus.

Withdrawals: Students may withdraw from the course and earn a grade of "W" up to and including the midterm date, which occurs on the **12th of October.** After midterm, students who withdraw will receive a grade of "WF." A WF is calculated in the GPA as an "F". The MGSC

Withdrawal Form is available online or in the Office of the Registrar.

Closures: If the campus is closed or has a delayed opening that interferes with class meeting times, the course schedule and assignment due dates will be adjusted accordingly. If the campus reopens in the middle of a lecture or laboratory time, consider the lecture or laboratory cancelled. If the campus is closed for one or the other, attend the lecture or laboratory that is scheduled when the campus is open. (e.g. If the campus is closed during lecture but is open during the laboratory time, attend the laboratory session.)

Evaluations: Student evaluations of faculty are administered online at the end of each term/session for all courses with five or more students. Students will receive an email containing a unique link to a survey for each course in which they are enrolled. All responses are anonymous and completions of evaluations are voluntary.

Course Requirements and Schedule

Requirements:

Tests	50%
Final Exam	20%
Homework	15%
Laboratories	15%

Grading Policy:

100 – 90%	A
89 – 80%	B
79 – 70%	C
69 – 60%	D
Less than 60%	F

Tests: **There are five in-class tests scheduled for this course.** They are closed book and no notes. **A formula page is allowed as long as it contains only formulas with subscripts five letters long and fits on one side of a sheet of notebook paper.** If a test is missed, you will receive a score of zero.

Final Exam: **The final exam will cover all the material covered in this course.** The final exam may contain material from the laboratory sections.

If a student has a test average of 90% or above after taking all of the scheduled tests may have their final exam grade replaced with their test average.

Homework: Problem solving is essential to learning physics. The more problems a student is exposed to, the better the student is at solving future problems that he/she may encounter.

Homework problems for each chapter are to be done via WebAssign. Due dates will be given with each assignment. Logging in will give you instructions on how this is to be done.

Working in groups on homework is important and encouraged. However, you will not take the tests and exams as a group. Each individual needs to be able to do the homework problems on their own to be successful in the course.

Reading the text is an important component of this course. Students are expected to have reviewed to the material before coming to class. This allows more time in class to discuss more complicated material that may not be easily conveyed in text. **Read the selected sections BEFORE coming to class.**

Laboratories: If your laboratory instructor is the same as your lecture instructor, **66% of your laboratory grade will be the average of your laboratory reports. The other 34% will be the average of your laboratory quizzes dropping the lowest laboratory quiz grade.** Otherwise, the laboratory grade will be determined by the laboratory instructor.

Groups: **Students will be broken up into groups assigned by the professor.** These groups will be used to facilitate your learning during lecture as well as serve as your activity and laboratory group. **Requests for specific students to be members of a specific group will be denied**.

Late Work: Assignments turned in late will receive a -10% penalty.

Extra Credit: The instructor may offer extra credit assignments at his discretion. All individual student requests for extra credit will be denied.

Disclaimer: **This syllabus is subject to change. However, it will not be changed without consulting the students. It is the privilege of the instructor to have the final word on the structure and content of the course.**

Course Content and Tentative Lecture Schedule:

Date:	Material:	Reading:
9 January	Introduction and Diagnostic Test	1:1 – 4
11	Chapter 2: Kinematics	2: 1 – 4, 8
16	**MLK Jr. Day (No Classes)**	
18	Chapter 2: Kinematics	2: 5 – 7
23	Chapter 3: Two Dimensional Kinematics	3: 1 – 3
25	Chapter 3: Two Dimensional Kinematics	3: 4 - 5 (4: 1 – 2)
30	Chapter 4: Dynamics: Force and Newton's Laws	4: 1 – 4
1 February	**Test #1: Chapters 2 – 3**	
6	Chapter 4: Dynamics: Force and Newton's Laws	4: 5 – 8 (5:1)
8	Chapter 5: Further Applications of Newton's Laws	5: 1 – 3
13	Chapter 6: Uniform Circular Motion and Gravitation	6: 1 – 3
15	Chapter 6: Uniform Circular Motion and Gravitation	6: 4 – 6
20	**Conference (No Classes)**	
22	Chapter 7: Work, Energy, and Energy Resources	7: 1 – 5
27	**Test #2: Chapters 4 – 6**	
1 March	Chapter 7: Work, Energy, and Energy Resources	7: 6 – 9
6	**Spring Break (No Classes)**	
8		
13	Chapter 8: Linear Momentum and Collisions	8: 1 – 4
15 **Midterm**	Chapter 8: Linear Momentum and Collisions	8: 5 – 6
20	Chapter 10: Rotational Motion and Chapter 9	10: 1 – 3, 9: 2
22	**Test #3: Chapters 7 – 8**	
27	Chapter 10: Rotational Motion	10: 4 – 5
29	Chapter 10: Rotational Motion and Chapter 9	10: 7, 9: 1, 3 – 5
3 April	Chapter 9: Statics and Torque and Chapter 11	9: 6, 11: 1-4
5	Chapter 11: Fluid Statics	11: 5 – 9
10	**Test #4: Chapters 9 – 10**	
12	Chapter 12: Fluid Dynamics	12: 1 – 4 (5 – 7)
17	Chapter 16: Oscillatory Motion and Waves	16: 1 – 6
19	Chapter 16: Oscillatory Motion and Waves	16: 7 – 11
24	Chapter 17: Physics of Hearing	17: 1 – 3, 5
26	**Test #5: Chapters 11, 12, and 16**	
1 May	Chapter 17: Physics of Hearing	15: 4, 6 – 7
3	**Final Exam (with Chapter 17) @ 1:00PM - 3:00 PM**	

Tentative Laboratory Schedule:

Date:	**Material:**
9 January	Tutorial: Representations of Motion
16	**MLK Jr. Day (No Classes)**
23	Addition of Vectors
30	Projectile Challenge
6 February	Atwood's Machine
13	Centripetal Force
20	**Conference (No Classes)**
27	Tutorial: Work and Energy
6 March	**Spring Break (No Classes)**
13	Energy of a Tossed Ball
20	Momentum, Energy, and Collisions
27	Moment of Inertia
3 April	Torques and Equilibrium
10	Tutorial: Pressure in a Liquid
17	Archimedes' Principle
24	Simple Harmonic Motion
1 May	Standing Waves
3	**Final Exam (with Chapter 17) @ 1:00PM - 3:00 PM**

Department of Natural Sciences

Introductory Physics II Syllabus

Course (CRN): PHYS 1112K (25054) **Credit Hours**: 4 h
Semester (Campus): Spring 2017 (Cochran) **Revision Date**: 7 January 2017
Lecture Times: MW - 9:30am - 10:45pm **Lecture Location:** Dillard Hall 112

Laboratory (CRN): PHYS 1112L (25055)
Laboratory Time: W - 11:00am - 12:50pm **Laboratory Location:** Dillard Hall 105

Instructor Information

Instructor: Mr. Edwynn Wallace
Email: edwynn.wallace@mga.edu
Office: Dillard Hall 106
Office Phone: 478) 934 – 3146

Office Hours:

MTWR:	8:30am – 9:30am
M:	10:45am - 12:45pm
W:	3:15pm – 5:15pm

Course Information

Prerequisites: Grade of "C" or better in PHYS 1111K **Corequisites:** PHYS 1111L

Course Description:

This introductory course will include material from electromagnetism, optics, and may include modern physics.

Student Learning Outcomes:

4. Demonstrate knowledge and understanding of the principles of electrostatics, electric current and circuits, electromagnetism, and optics.

5. Solve problems in physics using the principles of physics, mathematics including trigonometry, and multiple representations of physical systems.
6. Use various types of data collection tools for the experimental investigation of physical laws.

Required Texts: *College Physics, by OpenStax College*

Equipment: Scientific calculator ($10)**, WebAssign account,** and writing materials.

Additional Requirements: Internet Access, MGA E-mail Account

Class Policies

Attendance: Students whose number of absences is more than twice the number of class meetings per week may be assigned a failing grade for the course at the discretion of the instructor. Students who have more absences than the number of class meetings per week but less than twice the number of class meetings per week may be penalized at the discretion of the instructor. Students who have absences which are less than or equal to the number of class meetings per week will not be penalized.

If a student misses five of more class meetings, he/she will receive a failing grade for the course. Excused absences will not be counted.

Behavior: **The primary expectations of all Middle Georgia State University students are integrity and civility**. Each student should approach his/her academic endeavors, relationships, and personal responsibilities with a strong commitment to personal integrity and interpersonal civility. A full description of these responsibilities is found in the Student Handbook. (A full description of these responsibilities is found in the Student Handbook)

Misconduct: As a Middle Georgia State University student and as a student in this class, you are responsible for reading, understanding, and abiding by the MGSC Student Code of Conduct. The Student Code of Conduct is included in the *MGSC Student Handbook* and is available online at:

http://www.mga.edu/student-affairs/docs/MGSC_Student_Handbook.pdf

Cheating and plagiarism are serious violations and will not be tolerated! Cheating includes any attempt to defraud,

deceive, or mislead the instructor in arriving at an honest grade assessment. Plagiarism is a form of cheating that involves presenting another's work or ideas as one's own.

All portions of any assignment, test, or final exam submitted by a student must be that student's work. Individual reports from collaborative projects must be the individual's own work and not copied from other group members. Specific requirements will be described for collaborative projects, but all work presented must be the work of members of that group. Research materials used must be properly cited.

Violation of the Academic Misconduct Policy will result in a grade of zero for that test, project or exam.

The following will be considered cheating in addition to any other academic misconduct unlisted:

- Open possession of a cell phone or any other communication electronics (including music players) during a quiz, test, or exam.
- Use of a computer during a quiz, test, or exam for any reason unless authorized by the instructor.
- Notes pertaining to the course, including those entered into a programmable calculator, found during a test or exam.
- Using past quizzes, tests, or exams for this course from any instructor without the permission of the current course instructor.
- Revealing any knowledge about a quiz, test, or exam to anyone in any section of the course that has yet to take that quiz, test, or exam.

Disabilities: Students seeking academic accommodations for a special need must contact Middle Georgia State University Office of Disability Services in Macon at (478) 471-2985 or in Cochran at (478) 934-3023. Students may also visit the Disability Services Office in room 266 of the Student Life Center on the Macon campus or in Sanford Hall on the Cochran campus.

Withdrawals: Students may withdraw from the course and earn a grade of "W" up to and including the midterm date, which occurs on the **15th of March.** After midterm, students who withdraw will receive a grade of "WF." A WF is calculated in the GPA as an "F". The MGSC *Withdrawal Form* is available online or in the Office of the Registrar.

Closures: If the campus is closed or has a delayed opening that interferes with class meeting times, the course schedule and assignment due dates will be adjusted accordingly. If the campus reopens in the middle of a lecture or laboratory time, consider the lecture or laboratory cancelled. If the campus is closed for one or the other, attend the lecture or laboratory that is scheduled when the campus is open. (e.g. If the campus is closed during lecture but is open during the laboratory time, attend the laboratory session.)

Evaluations: Student evaluations of faculty are administered online at the end of each term/session for all courses with five or more students. Students will receive an email containing a unique link to a survey for each course in which they are enrolled. All responses are anonymous and completions of evaluations are voluntary.

Course Requirements and Schedule

Requirements:

Tests	50%
Final Exam	20%
Homework	15%
Laboratories	15%

Grading Policy:

100 – 90%	A
89 – 80%	B
79 – 70%	C
69 – 60%	D
Less than 60%	F

Tests: **There are five in-class tests scheduled for this course.** They are closed book and no notes. **A formula page is allowed as long as it contains only formulas with subscripts five letters long and fits on one side of a sheet of notebook paper.** If a test is missed, you will receive a score of zero.

Final Exam: **The final exam will cover all the material covered in this course.** The final exam may contain material from the laboratory sections.

If a student has a test average of 90% or above after taking all of the scheduled tests may have their final exam grade replaced with their test average.

Homework: Problem solving is essential to learning physics. The more problems a student is exposed to, the better the student is at solving future problems that he/she may encounter.

Homework problems for each chapter are to be done via WebAssign. Due dates will be given with each assignment. Logging in will give you instructions on how this is to be done.

Working in groups on homework is important and encouraged. However, you will not take the tests and exams as a group. Each individual needs to be able to do the homework problems on their own to be successful in the course.

Reading the text is an important component of this course. Students are expected to have reviewed to the material before coming to class. This allows more time in class to discuss more complicated material that may not be easily conveyed in text. **Read the selected sections BEFORE coming to class.**

Laboratories: If your laboratory instructor is the same as your lecture instructor, **66% of your laboratory grade will be the average of your laboratory reports. The other 34% will be the average of your laboratory quizzes dropping the lowest laboratory quiz grade.** Otherwise, the laboratory grade will be determined by the laboratory instructor.

Groups: **Students will be broken up into groups assigned by the professor.** These groups will be used to facilitate your learning during lecture as well as serve as your activity and laboratory group. **Requests for specific students to be members of a specific group will be denied**.

Late Work: Assignments turned in late will receive a -10% penalty.

Extra Credit: The instructor may offer extra credit assignments at his discretion. All individual student requests for extra credit will be denied.

Disclaimer: **This syllabus is subject to change. However, it will not be changed without consulting the students. It is the privilege of the instructor to have the final word on the structure and content of the course.**

Course Content and Tentative Lecture Schedule:

Date:	Material:	Reading:
9 January	Introduction and Diagnostic Test	
11	Chapter 13: Temperature, Kinetic Theory, & Gas Laws	13: 1 - 3
16	**Martin Luther King Jr. Day (No Classes)**	
18	Chapter 13: Temperature, Kinetic Theory, & Gas Laws	13: 4 - 6, 14:1-2
23	Chapter 14: Heat and Heat Transfer Methods	14: 3 - 7
25	Chapter 15: Thermodynamics	15: 1 - 3
30	Chapter 15: Thermodynamics	15: 4 - 7
1 February	Chapter 18: Electric Charge and Electric Field	18: 1 - 4
6	**Test #1: Chapters 13 – 15**	
8	Chapter 18: Electric Charge and Electric Field	18: 5 - 8
13	Chapter 19: Electric Potential	19: 1 - 4
15	Chapter 19: Electric Potential	19: 5 - 7
20	**Conference (No Classes)**	
22	**Test #2: Chapters 18 – 19**	
27	Chapter 20: Electric Current, Resistance, & Ohm's Law	20: 4 - 7
1 March	Chapter 21: Circuits and DC Instruments	21: 1 - 3
6	**Spring Break (No Classes)**	
8		
13	Chapter 21: Circuits and DC Instruments	21: 4 - 6
15 **Midterm**	Chapter 22: Magnetism	22: 1 - 5
20	**Test #3: Chapters 20 – 21**	
22	Chapter 22: Magnetism	22: 6 - 11
27	Chapter 23: Electromagnetic Induction, etc.	23: 1 - 6
29	Chapter 23: Electromagnetic Induction, etc.	23: 7 - 12
3 April	Chapter 24: Electromagnetic Waves	24: 1 - 4
5	**Test #4: Chapters 22 – 23**	
10	Chapter 25: Geometric Optics	25: 1 - 5
12	Chapter 25: Geometric Optics	25: 6 - 7
17	Chapter 27: The Wave Nature of Light	27: 1 - 8
19	Chapter 28: Special Theory of Relativity	28: 1 - 3
24	**Test #5: Chapters 22 – 24**	
26	Chapter 28: Special Theory of Relativity	28: 4 - 6
1 May	Chapter 29 & 30: Quantum Mechanics & Atomic Physics	29, 30: 1 - 9
3	**Final Exam (including Chapters 28-30) @ 8:00am - 10:00am**	

Tentative Laboratory Schedule:

Date:	**Material:**
11 January	Tutorial: Ideal Gas Laws
18	Thermal Expansion
25	Tutorial: First Law of Thermodynamics Tutorial
1 February	Tutorial: Charge
8	Electric Field Simulation & **Lab Quiz**
15	Equipotentials and Electric Fields
22	Chapter 20: Electric Current, Resistance, & Ohm's Law (Read 20: 1 – 3)
1 March	Resistance in Series and Parallel
8	**Spring Break (No Classes)**
15	RC Circuits & **Lab Quiz**
22	Magnetic Field in a Slinky
29	Electromagnetic Induction
5 April	Tutorial: Plane Mirrors
12	Spherical Mirrors and Lenses
19	Activity: To Be Announced & **Lab Quiz**
26	Lecture: Quantum Mechanics & Atomic Physics
3 May	**Final Exam (including Chapters 28-30) @ 8:00am - 10:00am**

Final Report

Affordable Learning Georgia Textbook Transformation Grants

Final Report

Date: 22 May 2017

Grant Number: 175

Institution Name(s): Middle Georgia State University

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Edwynn Wallace, Associate Professor, Department of Natural Sciences, edwynn.wallace@mga.edu

Malav Shah, Associate Professor, Department of Natural Sciences, malav.shah@mga.edu

Project Lead: Edwynn Wallace

Course Name(s) and Course Numbers: Introductory Physics I - PHYS 1111K/L and Introductory Physics II - PHYS 1112K/L

Semester Project Began: Fall 2015

Semester(s) of Implementation: Summer 2016, Fall 2016, and Spring 2017

Average Number of Students Per Course Section: 17

Number of Course Sections Affected by Implementation: 8

Total Number of Students Affected by Implementation: 137

1. Narrative

Transforming the Introductory Physics (Trigonometry Based) course sequence was an informative and challenging process. Our transformation was centered on adopting the College Physics text by OpenStax. Writing the proposal for the grant illuminated the physics faculty to the costs associated with our current offerings. It introduced many faculty members to the option of adopting open educational resources for their courses. Students had an overall positive opinion of the College Physics textbook. However, the quality and lack of supportive materials was a challenge to the instructors that participated in the project. Even though drop, withdraw, or Fail (D/W/F) rates decreased, student performance decreased as well.

The cost to students dropped dramatically for this project. The 137 students enrolled in the course sections saved and estimated total of $24,720. A few sections of the course required

a laboratory text book that added additional costs. Many of those labs were replaced with Vernier laboratory and other exercises that have no additional costs to the student.

The D/W/F rate dropped from a previous 30.7% to 20.4% for sections using the OpenStax text. Overall, the proposal's general goals of lowering the costs to students and improving D/W/F rates were met.

College Physics by OpenStax is a good physics text. The coverage of material is more than sufficient. It handles all the essential topics in physics and goes into many areas that some publisher's texts do not such as certain biology and medical applications. Most students surveyed had a positive evaluation of the textbook especially the content and visuals. A challenge for instructors was the supplemental materials associated with the textbook. The PowerPoint slides provided were only pictures and diagrams from the text. More explanatory presentations had to be developed for use in the classroom. The homework problems provided in WebAssign were numerous but lacked conceptual content questions. A test bank was also nonexistent.

After implementation of the project, there was a performance drop on standardized assessments for both courses. The normalized gain on the Force Concept Inventory (FCI) used to evaluate Introductory Physics I dropped by 16.6%. The normalized gain on the Conceptual Survey of Electricity and Magnetism (CSEM) used for Introductory Physics II dropped by 12.2%

Open educational resources are improving at a rapid pace but were underdeveloped at the time we initiated the textbook transformation. We should have used more time in the preparation and implementation stages of the project to search for or develop more supplementary materials for the courses we transformed. We could have adopted a more robust homework system that had more conceptual exercises such as Sapling Learning or ExpertTA.

2. Quotes

Unfortunately, any direct comments about the College Physics textbook were not found in the student course evaluations administered by the University. The survey used by students to evaluate the textbook did not have a free response comment section.

3. Quantitative and Qualitative Measures

3a. Overall Measurements

Student Opinion of Materials

Was the overall student opinion about the materials used in the course positive, neutral, or negative?

Total number of students affected in this project: 137

- Positive: 44% of 54 number of respondents
- Neutral: 39% of 54 number of respondents
- Negative: 17% of 54 number of respondents

Student Learning Outcomes and Grades

Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?

Choose One:

- ___ Positive: Higher performance outcomes measured over previous semester(s)
- ___ Neutral: Same performance outcomes over previous semester(s)
- _X_ Negative: Lower performance outcomes over previous semester(s)

Student Drop/Fail/Withdraw (DFW) Rates

Was the overall comparative impact on Drop/Fail/Withdraw (DFW) rates in the semester(s) of implementation over previous semesters positive, neutral, or negative?

Drop/Fail/Withdraw Rate:

20.4% of students, out of a total 137 students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:

- _X_ Positive: This is a lower percentage of students with D/F/W than previous semester(s)
- ___ Neutral: This is the same percentage of students with D/F/W than previous semester(s)
- ___ Negative: This is a higher percentage of students with D/F/W than previous semester(s)

3b. Narrative

Drop/Withdraw/Fail Rates:

D/W/F data pre-implementation was sampled from one section each for PHYS 1111K – and PHYS 1112K from both team members. The totals given are for all four sections combined.

D/W/F Rates Pre-Implementation	
D/W/F Total	31
Total Enrolled	101
D/W/F %	**30.7%**

D/W/F data post-implementation was gathered from eight sections of both PHYS 1111K and PHYS 1112K taught by the team members and other instructors who volunteered to participate.

D/W/F Rates Post-Implementation	
DWF Total	28
Total Enrolled	137
D/W/F %	**20.4%**

Force Concept Inventory

The FCI is a standard assessment used to evaluate students' conceptual understanding of physics in the first semester course. The score is given as a percentage of correct responses. It is administered as a pre-test at the beginning of the semester and again as a post-test at the end. Student improvement is evaluated using a normalized gain to diminish the impact of low pre-test scores. Normalized gain is calculated using the formula:

$$\frac{(Post\ Test\ Score - Pre\ Test\ Score)}{100 - Pre\ Test\ Score} \times 100$$

Pre-implementation data was compiled from the same PHYS 1111K sections used for D/W/F rates. Post-implementation data was compiled from four sections of PHYS 1111K that returned results to the team. The reported gain is an average weighted by the number of students enrolled in each section at the beginning of the semester.

FCI Results	
	Normalized Gain
Pre-Implementation	26.2
Post-Implementation	21.8
Difference	-4.3
Percent Difference	**-16.6%**

Conceptual Survey of Electricity and Magnetism

The CSEM is a standard assessment used to evaluate students' conceptual understanding of physics in the second semester course. It is administered and evaluated in the same manner as the FCI.

Pre-Implementation data was compiled from the same PHYS 1112K sections used for D/W/F rates. Post-Implementation data was compiled from two sections of PHYS 1112K that returned results.

CSEM Results	
	Normalized Gain
Pre-Implementation	19.1
Post-Implementation	16.8
Difference	-2.3
Percent Difference	**-12.2%**

Student Textbook Evaluation Survey

At the end of the semester, students were asked the following 20 questions on a written survey broken up into sections pertaining to subject matter:

Content:

1) The material in the textbook was easy to read and understand.
2) The content of the textbook was broken up into logical sections.
3) The concepts flowed effectively from one topic to another.
4) The problem-solving hints and techniques were useful.
5) The example problems in the text helped me to solve physics problems.
6) The content helped me understand the instructor's lecture.
7) The content helped me complete my homework assignments.
8) The content helped me with the laboratory experiments and activities.
9) The content helped me on my quizzes, tests, or exams.
10) I found the material in the textbook useful in learning physics.

Visuals and Textual Elements:

11) The textbook has quality illustrations and pictures.
12) The illustrations and pictures are clear and easy to understand.
13) The illustrations and pictures helped me to learn the concepts in the text.
14) The tables, charts, and graphs were easy to obtain information from.
15) The size of the print and choice of font was easy to read.
16) The text was formatted in a clean and organized manner.

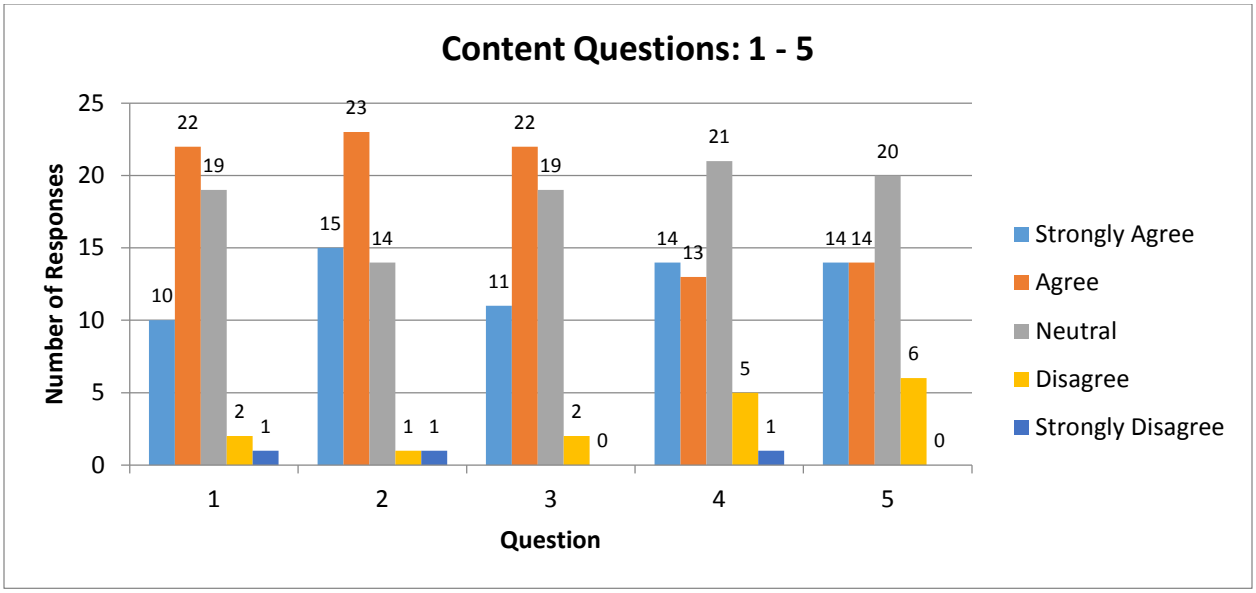
Overall Experience:

17) I used the textbook often during the course.
18) I enjoyed reading and using the textbook.
19) This textbook is comparable to publisher's textbooks.
20) The textbook was an effective tool in learning physics in this course.

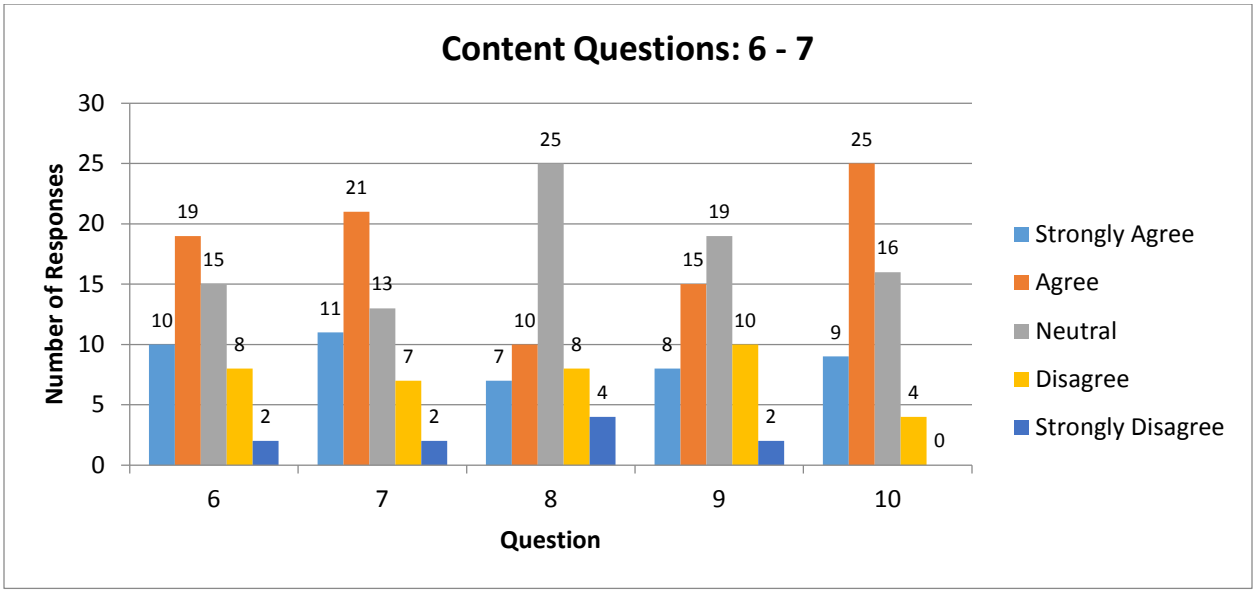
They responded to the questions using the scale below:

5 – Strongly agree; **4** – Agree; **3** – Neutral; **2** – Disagree; **1** – Strongly Disagree

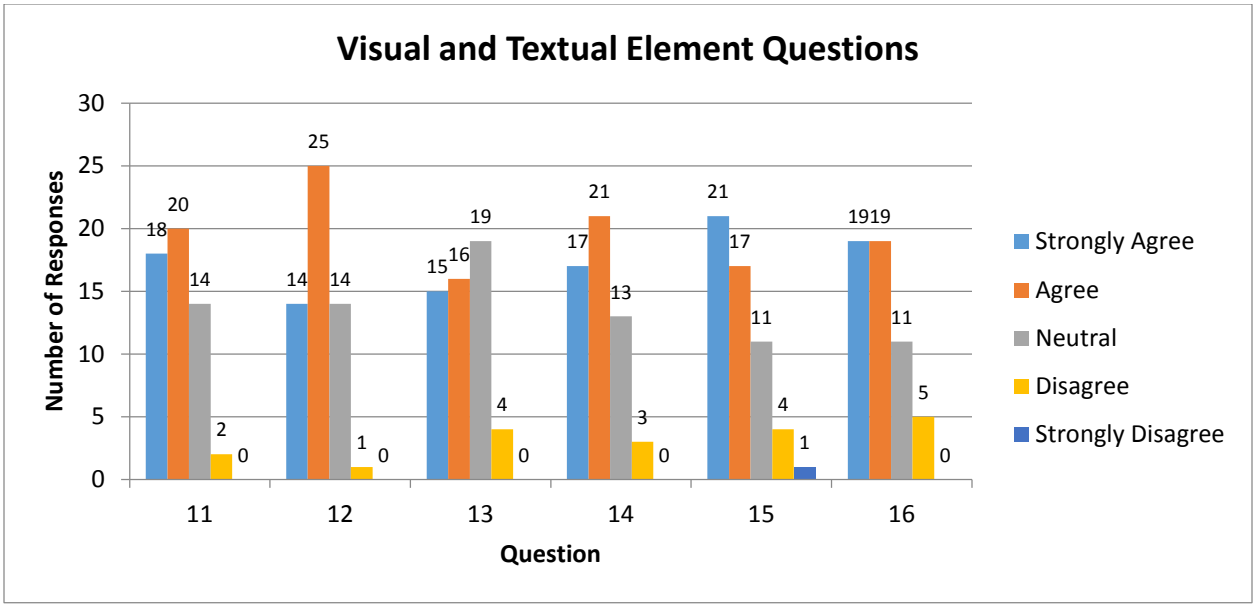
The graphs below were compiled from three sections of PHYS 1111K and one section of PHYS 1112K for a total of 54 samples.



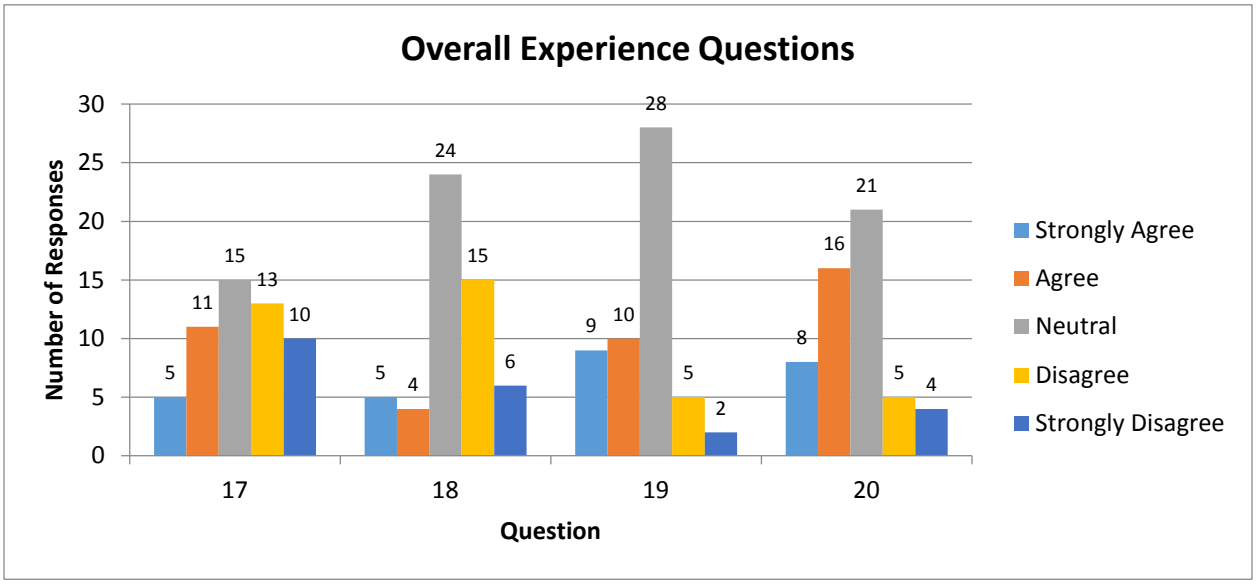
There is strong agreement with questions 1 – 3 pertaining to the conceptual content structure. However, students were mostly neutral on the problem solving content.



There is a strong agreement with how helpful the text was with lecture and homework. The student response to question 8 shows a possible disconnect between content in the laboratory and content in the text. The results of question 10 indicate an overall approval of the material presented in the text.



Students were overall satisfied with the print and visuals used in the textbook.



Even though students were mostly positive in the previous sections, they are mostly neutral with their overall experience. Many students responded that they did not use the textbook often nor did they enjoy reading it. Question 20 was used to gauge the students' overall appraisal of the textbook with the majority of students (24) agreeing that the textbook is effective in learning physics.

Student Evaluation of Faculty

Results from the student evaluations of faculty were not recorded due to the private nature of faculty evaluations.

4. Sustainability Plan

The PowerPoint presentations developed for the Introductory Physics courses need to be reviewed to make sure all the content on the slides are from open sources. Afterward, the presentations will be made available for public use from a team member's faculty website. The textbook survey will also be made available on the same website. This should require no further costs.

5. Future Plans

Even though there was a decrease in the D/W/F rates and the students were overall satisfied with the textbook, the physics faculty at Middle Georgia State University has decided to use a publisher based textbook for the Introductory Physics sequence. The overall lack of instructor satisfaction with the textbook, its supplementary materials, and the lowered student performance are the basis for this decision. However, some sections of the Introductory Physics course sequence will only require e-book versions of the text instead of print versions in order to cut down costs to students. Students in all sections will not be required to purchase a laboratory text which saves an additional $200. This project has made the physics instructors at the University more aware of the burden of textbook costs and associated additional costs of education. As more open source content is developed and refined for physics, Middle Georgia's physics faculty may revisit the process of textbook transformation. The experience gained from this project will facilitate a possible future transition to open educational resources.

6. Description of Photograph

(Left to right) Edwynn Wallace, project lead, subject matter expert, and instructional designer; Malav Shah, subject matter expert and instructional designer.