

# Affordable Learning Georgia Affordable Materials Grants Continuous Improvement Grants Final Report

(or Mini-Grants, for R17 and earlier)

## General Information

Date: 05/16/2025

Grant Round: Round 24

Grant Number: M266

Institution Name(s): Georgia State University

Team Members (Name, Title, Department, Institutions if different, and email address for each): Tesfaye Negash Asfaw, Senior Lecturer, Dept of Physical Sciences <tasfaw2@gsu.edu>; Mathes A. Kanishka Dayananda, Associate Professor, Dept of Physical Sciences <mdayananda1@gsu.edu>; Jay P Dunn, Interim Associate Chair, Dept of Physical Sciences <jdunn1@gsu.edu>; Taha Mzoughi, Associate Professor, Dept of Physical Sciences <tmzoughi@gsu.edu>; Alexis Nduwimana, Professor, Dept of Physical Sciences <anduwimana1@gsu.edu>

Project Lead: Taha Mzoughi

Course Name(s) and Course Numbers: Principles of Physics I (PHYS 2211)

Final Semester of Project: Spring 2025

### ***If applicable to your project:***

Average Number of Students Per Course Section: 22.9

Number of Course Sections Affected by Implementation of Revised Resources: 10

Total Number of Students Affected by Implementation of Revised Resources: 229

## 1. Project Narrative

- *A summary of your project's purpose, plan, and timeline.*

The goals of our project were:

1. Develop a homework template for PHYS 2211 course by modifying or newly creating MyOpenMath questions so that the following elements are present: (a) the ability to add individualized detailed solutions to the randomized questions. (b) the ability to add pedagogically sound, educational research inspired, and strategically positioned, pointers and hints.
2. Develop a MyOpenMath homework set that can be used as a free formative assessment for students when taking the PHYS 2211 course sequence taught by the participating faculty.

3. Develop a MyOpenMath Guiding Quiz set that can be used as a free formative assessment for students and faculty when using the Open Educational Resources platform LibreTexts' (<https://libretexts.org/>) adapted versions, of the OpenStax University Physics text. The Guiding Quizzes can be easily embedded within the text.
4. Take advantage of the MyOpenMath collaborative tools to make the resources easily available to others for use and adaptation.
5. Share the findings with the GA Affordable Learning community, as well as with colleagues in the discipline.

The main milestones we set up for our project were:

- Summer 2024: Getting Familiar with MyOpenMath, learning how to code questions, and prep a homework test for Fall 2024.
- Fall 2024: Testing homework in classes we teach while continuing to develop questions and homework sets.
- Spring 2025: Implementing homework in classes we teach while continuing to develop questions and homework sets. Continue to work on fixing and improving the sets we have developed
- The original works which were revised or added to, with links. For example, if you revised an open textbook, give the title, author, and link.

Our project involved developing and adapting content for use as homework for Georgia State University's Perimeter College Principles of Physics PHYS 2211 classes. We did not revise or add to existing content; we created new content. Prior to the project, these courses used either commercial products or in-house content that was much more limited in scope and capabilities.

- A narrative description of how the project's plan was carried out.

The project lead, Mzoughi, was the only person with prior familiarity with MyOpenMath, the platform selected for the project. We began in Summer 2024 by focusing on Mzoughi acquainting the other team members with MyOpenMath capabilities and methods. Additionally, baseline content from other institutions teaching similar courses was collected. One of the team members, Nduwimana, chose to start using MyOpenMath for teaching an Introductory Physics Course, PHYS 1111, as he was assigned to teach it during the summer. The remaining team members focused on building the content for the courses they were scheduled to teach during Fall, both collaboratively and individually.

For Fall 2024, all team members continued to improve their familiarity with MyOpenMath and to develop content for their courses. Team members Asfaw, Dayananda, and Mzoughi used the content they developed in teaching PHYS 2211. Asfaw and Nduwimana used the content they developed in teaching PHYS 1111.

During the end of Fall 2024, the project lead, Mzoughi, worked with CETLOE and MyOpenMath to integrate MyOpenMath with USG's version of Brightspace. These efforts came to fruition just before Spring 2025, making it much easier for faculty to post assignments within Brightspace.

Since MyOpenMath capabilities are extensive and can be challenging to master, for Spring 2025, all team members have continued to improve their familiarity with MyOpenMath and to develop content for their courses. Team members Asfaw, Dune, and Mzoughi improved upon the content they used during Fall and used it in teaching PHYS 2211; Nduwimana did the same with PHYS 1111. Moreover, the project lead, Mzoughi, took advantage of the added integration with Brightspace to add two new types

of assignments to the course. The first assignment, "Phantom Quizzes," was designed to help students self-report their attendance in an engaging format during the first five minutes of class. The second assignment is a formative quiz that was assigned using MyOpenMath at the end of every class period.

- *Lessons learned, including anything you would do differently next time.*

The project worked as planned. We have learned better methods for streamlining the coding of homework questions. We also learned that, despite our best efforts, some coding adjustments are sometimes needed for certain questions. We have relied on and trusted student feedback when verifying coding errors. The homework connection was instrumental to the project's success. The experience that all team members have gained will help us more easily implement the same methods for other courses.

## 2. Materials Description

We are providing seven PDFs:

- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_GSU-P-Physics-A01.pdf: A printout of the main page of the promoted, fully accessible course we are providing in MyOpenMath, focusing on the PHYS 1111 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_GSU-P-Physics-C01.pdf: A printout of the main page of the promoted, fully accessible course we are providing in MyOpenMath, focusing on the PHYS 2211 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_1111-example-homework.pdf: A printout of an example homework assignment from the PHYS 1111 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_2211-example-GQ.pdf: A printout of an example "Guiding Quiz" assignment from the PHYS 2211 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_2211-example-PQ.pdf: A printout of an example "Phantom Quiz" assignment from the PHYS 2211 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_2211-example-homework.pdf: A printout of an example homework assignment from the PHYS 2211 course content.
- ALG\_CI\_R24\_M266\_GSU\_Mzoughi\_2211-example-quiz.pdf: A printout of an example "Quiz" assignment from the PHYS 2211 course content.

## 3. Materials Links

To preserve the integrity of the assignments, we will not offer open access to everyone. Faculty who teach physics can join MyOpenMath for free and have direct access to all of our content. To make access easier, we grouped the content we have developed into two courses designed for that particular purpose. The two courses are: GSU-P-PHYSICS-A01 for PHYS 1111 content, and GSU-P-PHYSICS-C01 for PHYS 2211. Moreover, both courses were set up as "promoted" to help facilitate access for others.

## 4. Future Plans

- *Describe any planned or actual papers, presentations, publications, or other professional activities that you expect to produce that reflect your work on this project.*

Mzoughi, the project lead, has made three presentations focusing on the use of MyOpenMath:

- “Using Freely Available Tools to Develop More Effective Assignments,” presentation, Georgia State University-Perimeter College, Friday, November 8, 2024.
- “Using JSXGraph to Generate Dynamic Graphs When Using MyOpenMath.org,” presentation, Fall Meeting of the Southern Atlantic Coast Section of the American Association of Physics Teachers (SACS-AAPT), Online, October 26, 2024.
- “Using JSXGraph in MyOpenMath to Write Introductory Physics Questions,” presentation, 5th International JSXGraph Conference (<https://jsxgraph.org/conf2024/>), Online, October 9, 2024 (<https://www.youtube.com/watch?v=VRhla36-IYg>)
- *Describe any plans to revise or add to these materials in the future.*

All team members will continue to use and improve the content that they have developed during this project for the PHYS 2211 and PHYS 1111 courses. In addition, we hope to get financial support to help develop content for the PHYS 2212 and PHYS 1112 courses, and for the lab courses supporting all four of these courses.