

Application Number	M58
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Type	Revision of pre-existing OER
Course Number / Title	Math 1450
Final Semester	Fall 2019
Grant Amount	\$4,800

Works Being Revised	Grant # 264 - Round 4 Title: Zero-cost textbooks and online homework management system for four mathematics courses (Calculus I, Calculus III, Differential Equations and Linear Algebra) URL Address: https://oer.galileo.usg.edu/mathematics-collections/29/
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<p>Description</p>	<p>Our goal is to revise the Calculus I material (Class notes and online homework and assessment system using WeBWork, a free online system) created in our previous grant # 264 – rounds 7 where our aim was to create a zero-cost Calculus I materials. We tried our best to adjust the materials that we produced, based on the chosen textbook, with our students’ needs and to fulfill the learning goals stated in our syllabus. We faced two obstacles during the implementation process of the Calculus I segment of our grant # 264; the choice of the textbook and the online homework system (WeBWork at a zero-cost). The main concern was related to the choice of the online system. Students usually expect a system that has similar commercial system features and its online problems are compatible with the textbook exercises. That was not available at that time. Another concern was that students who usually signed for this course end up majoring in Mathematics or Engineering Fields where supplementary and challenging problems are needed. To complement the textbook exercises, we used problems from WeBWork to achieve this goal. Students noticed that most problems from the selected textbook were limited compared to those from WeBWork where we want students to try. Students who are familiar to a commercial online homework system based on costly textbooks were not happy with our approach.</p> <p>In conclusion, we found that our choice of the Open Calculus I textbook should have the option to utilize an online homework system with features close to a commercial system that support the same textbook. This Open resource approach that serve our students’ needs became available recently. An open Calculus textbook, which we will referred to as a new open textbook, that fits our and students needs was released by Lyryx Advanced Learning as an open educational resource and made available in 2018 [Calculus: Early Transcendentals – Version 2017 — Revision A - by D. Guichard]. The new textbook will achieve our aim in teaching our Calculus courses and fulfill calculus I students need of an online homework system based on the same textbook. Moreover, other positive features in the Lyryx new textbook are (https://lyryx.com):</p> <ul style="list-style-type: none"> • Students are awarded partial marks reflecting their efforts. Partial marks are also awarded for “consistent” answers; an answer that is incorrect but is correctly deduced from, or consistent with, a previous answer. This avoids penalizing the student again and helps them to identify exactly where the actual error was committed. • Students feel no threat in attempting a question again, as each time only a better mark is recorded, encouraging them to learn by practice. • Each question instance is similar but genuinely new and randomized — encouraging learning by giving students an opportunity to rethink the problem. Students can practice questions, learn, and then repeat. • We would like to use this textbook and develop the following materials to make them available to our faculty and any other faculty who seek open resources materials for Calculus I and II courses. • Lyryx provides all the tools required to manage instructor’s online homework, including to create and maintain the assignments, generate student grade reports, student performance and statistical data analysis, and the ability to view marked assignments. <p>Our plan is to develop courseware materials that are both zero-cost and low cost to</p>
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students as indicated below:

A. Zero-cost materials: Develop courseware materials that include class notes and online homework and assessment system using WeBWork to match the new textbook and make the course a zero-cost for students. We will review our WeBWork homework sets developed in previous grant #178 to be compatible with the new textbook.

B. Low-cost materials: Instead of using a fully free online homework and assessment system, we will use an affordable system, Lyryx online system, which cost students \$39.95 per semester. Lyryx is now available and test bank and homework problems were developed based on the new textbook. Lyryx online assessment is affordable and includes a value-added service and support. (https://lalg1.lyryx.com/unprotected-servlets/DemoQuestionServlet?text=CALCULUS_1&command=new). From our experience in using Open resources, we found that in some circumstances and especially with non-remedial courses, a low-cost assessment system might be a better choice. This low-cost system, like Lyryx, usually has similar features offered by a costly commercial system and may be more practical to use than the available free system WeBWork, which lacks some of the advanced features in a commercial system. Moreover, students who had experience using a commercial system in previous courses will prefer using similar system and don't mind paying the \$39.95 cost per semester. This is the reason we are proposing the low-cost option in addition to the zero-cost option. On the other hand, faculty who prefer to choose zero-cost materials can still use the developed materials in our zero-cost option.

Timeline	<p>Both Team members (Hashim Saber and Bikash Das) will contribute their expertise to the following milestones:</p> <ul style="list-style-type: none">• March 2019 – April 2019. Review class notes material and develop class notes using the new proposed textbook and matches the course objectives stated in the mathematics department syllabus.• May 2019. Review all WeBWorK assessment materials and develop additional sets to match the sections in the new textbook. This part and the developed class notes will be the zero-cost option package.• June 2019-July 2019. Develop new assessment materials using Lyryx system. This will include homework and quiz problems selected from the new text book. This part and the developed class notes will comprise the low-cost option package.• August 2019. Submit the final report and make all class materials available to University of North Georgia faculty and other compasses faculty who opt to use Open resources in teaching their calculus I course for both options low-cost and zero-cost.
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Budget	Faculty additional time for preparing instructional materials. Two persons on the project will cost \$4000. Additional cost of \$800 will cover two multi-semester cost of the Lyryx system (\$79.95 each), hard copy of the textbook, material supplies (papers, copies, printer cartridge), and travel money to present the results in a conference.
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