

**Affordable Learning Georgia Textbook Transformation Grants  
Proposal Form**

*Please complete per inline instructions; completed form not to exceed four pages.*

<b>Institution Name</b>	Southern Polytechnic State University		
<b>Team Members (Name, Title, Department and email address for each)</b>	Lu Kang, Ph. D., Assistant Professor, Department of Biology and Chemistry, SPSU, <a href="mailto:lkang@spsu.edu">lkang@spsu.edu</a>  Zhigang Li, Ph. D., Instruction Technology Specialist, Instructional Design of SPSU, <a href="mailto:zli24@spsu.edu">zli24@spsu.edu</a>		
<b>Sponsor, Title, Department</b>	Mark Sugalski, Ph. D., Associate Professor, Chair, Department of Biology and Chemistry, SPSU, <a href="mailto:msugalsk@spsu.edu">msugalsk@spsu.edu</a>		
<b>Course Name, Course Number and Semester Offered (Spring 2015 Required)</b>	Principle of Chemistry I  CHEM 1211  Spring 2015 semester		
<b>Average Number of Students in the Course</b>	24	<b>Number Course sessions per Academic year</b>	32
<b>Award Category (pick one)</b>	<input checked="" type="checkbox"/> No-Cost-to-Students Learning Materials <input type="checkbox"/> OpenStax Textbooks <input type="checkbox"/> Course Pack Pilots		
<b>List the original course materials for students (including title, whether optional or required, &amp; cost for each item)</b>	Chemistry, by Zumdahl  Required Textbook  The Sapling Learning on-line homework system  <a href="http://www.saplinglearning.com">www.saplinglearning.com</a>	<p align="center"><i>[Cost]</i></p> <p align="center">~\$200 for a new textbook ~\$40 for each semester</p> <p align="center"><b>Total Cost</b></p> <p align="center"><b>~\$240</b></p>	
<b>Projected Per Student Cost</b>	No-cost to student	<b>Projected Per Student Savings (%)</b>	100%

## **1. PROJECT GOALS**

- Develop no-cost-to-students learning materials for the Principle of Chemistry I, CHEM 1211, a critical core course for STEM major students.
- Develop appropriate learning materials to fit the needs of engineering and technology major students in their study of chemistry through adoption of open textbook and adaptation of open educational resources (OER).
- Create an online teaching environment and use it as an auxiliary tool to facilitate student self-learning with OER.
- Implement a well-rounded course instruction platform using Desire2Learn (D2L) and provide a course template to other faculty members from USG institutions.

### **1.1 STATEMENT OF PROBLEM**

Principles of Chemistry I, CHEM 1211, one of the top 50 USG lower-division courses, is a critical core course for all engineering and technology (E&T) students because they need some fundamental chemistry knowledge and lab skills to support their studies in E&T. However, almost all intro-level chemistry textbooks are written in favor of science majors because there are much more science majors than E&T majors nationwide. Thus the course contents are organized and the examples are selected mainly for developing science majors. Too many theories and few practical examples are given to E&T majors in CHEM 1211. The cost of learning materials is another problem! A student has to pay \$200 for a textbook, \$40 for an on-line homework system, and \$100 (\$75 lab materials; \$20 lab manual; \$5 goggle) for its co-requisite lab, CHEM 1211 L. In summary, an overall cost for this one semester course is \$340 – a big burden to our students.

Southern Polytechnic State University (SPSU) is known for its E&T programs. More than 85% CHEM 1211 students are E&T majors. They do need some practical chemistry knowledge and skills to help them understand their E&T course materials, but definitely not devote themselves to the fundamental chemistry theories. A heavily theory oriented textbook won't be a good choice for E&T major students. They cannot link the chemistry theories to an industry production line in our classrooms. For example, the distribution coefficient, a very useful and practical concept for material extraction and purification industry, is not even introduced in CHEM 1211 because this topic makes no significance in developing new theory. In upper-level chemistry courses, the distribution coefficient is called the partition coefficient. Most students will be fooled by such a word game!

For most E&T major students, CHEM 1211 and its co-requisite lab, CHEM 1211 L are the only chemistry courses for their undergraduate studies. If they couldn't learn some useful and applicable things, together with the high cost, few students would enjoy this course. Our anonymous student survey pointed out that many E&T majors complained CHEM 1211 as a course of being no use and a waste of money and time! The drop, fail, and withdraw (DFW) rates of CHEM 1211 can be as high as 30% to 40% - significantly higher than other academic programs.

In view of these, we propose to develop new instruction materials to improve this. Firstly, we would like to adopt open source textbooks to reduce the cost of CHEM 1211 instruction materials. Each student can save up to \$200 from this choice. Secondly, we intend to develop new examples, quizzes, and homework that can link chemistry to E&T applications. Furthermore, within the scope of USG learning objectives, we attempt to integrate more E&T topics into our CHEM 1211 course materials. The content beyond the open textbooks will be uploaded to the corresponding D2L course modules. Thirdly, we would like to develop an online homework system based on the D2L platform. Our students can save \$40 from this. Overall, a CHEM 1211 student can save \$240 from our proposed project. Given the fact that SPSU serves ~800 CHEM 1211 students per year, an annual saving of \$150k – \$200k is expectable. It is our desire that the reduced cost and improved instruction materials can encourage more E&T students take chemistry seriously and thus improve DFW rate.

## **1.2 TRANSFORMATION ACTION PLAN**

There are many Open Educational Resources (OER) and open textbooks available for intro-level chemistry courses. We will review them early in this fall semester and adopt one book as the primary instructional material. To best fit the needs of E&T programs, we intend to “cherry pick” some useful contents and interesting topics from other OER as auxiliary materials. Beyond that, all CHEM 1211 topics will be broken down to various knowledge points. Corresponding course materials will be selected and organized in a way to enhance student learning of these knowledge points. As part of the goal of this project, we will develop new examples, quizzes, and homework assignments that are best aligned with the needs of E&T majors. Such a course design not only clarifies the everyday tasks but also simplifies the assessment processes. The project designer, L. K., Ph.D., with 10 years’ college teaching experience, will be responsible for the selection and organization of instruction materials, overall course design, assessment plan, and syllabus redesign. The instruction technology specialist, Z. L., Ph.D., with extensive experience in instructional design and technology, will be responsible for instructional design as well as making sure the learning materials and assessments are aligned with the course objectives. He will also be responsible for integrating various instructional technologies into the course design as well as developing the course materials in the D2L learning environment.

For the quantitative assessment of student success and experience, we plan to:

- 1) Use American Chemical Society (ACS) standardized exam to compare our students’ academic performance with that of other chemistry programs. The ACS standardized exam is a nationwide legislated test that can provide detailed information of student performance in comparison with the national average.
- 2) Use the uniform final exam of SPSU chemistry program to compare the passing rates of each assessment category for two groups of students – open textbook/OER group vs commercial textbook group.

All comparison results and DFW rate will be reported by our assessment report.

For the qualitative assessment of student success and experience, we attempt to:

- 1) Use Student Instructional Report (SIR-II) results from the Educational Testing Service (ETS) to obtain students' feedback.
- 2) Give an on-line survey using D2L to obtain students' feedback.
- 3) Contact the "Center for Teaching Excellence" (CTE) of SPSU and schedule an on-site midterm evaluation to collect students' feedback.

### **1.3 TIMELINE**

- 09/2014: Collect information from E&T programs to know their expectations and favorite topics about chemistry knowledge.
- 10/2014: Review open textbooks and OER to choose appropriate instruction materials for E&T students.
- 11/2014: Organize course materials in knowledge points and develop the corresponding D2L modules for course contents.
- 12/2014: Develop course assessment methods (quizzes, homework, surveys, etc.) and implement them to D2L.

### **1.4 BUDGET**

- 1) \$5,000. Release time/salary for team member 1 – Lu Kang
- 2) \$5,000. Release time/salary for team member 2 – Zhigang Li
- 3) \$800. Instructional materials; Travel; ACS standardized exam

### **1.5 SUSTAINABILITY PLAN**

We would like to make continuous efforts to develop this course until it meets the needs E&T students perfectly. Due to the time limit, we have to adopt an open textbook for our students in spring 2015 semester. In the future, we would like to develop more instruction materials and replace the adopted open textbook with our own open source instruction materials that build in to the D2L environment. All course materials will be uploaded to D2L server and distributed as an OER to USG chemistry programs. Since CHEM 1211 is one of the most popular core courses for STEM students, it will be offered every semester (including summer) with large-enrollment classes.

### **1.6 REFERENCES & ATTACHMENTS**

**SOUTHERN  
POLYTECHNIC**  
STATE UNIVERSITY  
Department of Biology and Chemistry

Mark T. Sugalski, Ph.D.  
Chair, Department of Biology & Chemistry  
1100 South Marietta Parkway, E-183  
Marietta, Georgia 30060-2896

678-915-3601 OFFICE  
678-915-5101 FAX  
msugalsk@spsu.edu

spsu.edu/biology  
spsu.edu/chemistry

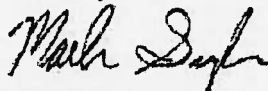
To the ALG Grant Representatives,

As Chair of the Department of Biology and Chemistry at Southern Polytechnic State University (SPSU) I wholeheartedly support this project as proposed by Drs. Kang and Zhigang. The project stands to have a significant and immediate positive financial effect on students, which will be of great benefit to those that cite college-related expenses as a reason why they cannot continue their education.

Once this project has been completed it will be a relatively simple matter to maintain and distribute the materials using course administration software that is already in use at SPSU (namely, GeorgiaVIEW Desire2 learn). Thus, there is a high probability that the efforts of this project will be sustainable over the long term.

In closing, I encourage the ALG grant representatives to fund this project. The potential impact on students will be significant and sustainable over the long term.

Sincerely,



Mark T. Sugalski, Ph.D.  
Chair, Department of Biology & Chemistry  
Department of Biology & Chemistry  
Southern Polytechnic State University  
678-915-3601  
[msugalsk@spsu.edu](mailto:msugalsk@spsu.edu)

