Vol. 2, Issue 2
Fall 2015

the Periodical

Southern Adventist University Chemistry Department

Chemistry Department partners with area academy

By Brent Hamstra

The Chemistry Department is collaborating with Georgia-Cumberland Academy in Calhoun, Ga., to offer General Chemistry I and II to academy students under the instruction of Chemistry teacher Dr. Marty Briggs.

After successfully completing the regular high school chemistry course at GCA, qualified students may take General Chemistry I and II in a second year of chemistry prior to their graduation. GCA students taking General Chemistry use the same textbooks as Southern Adventist University students and conduct many of the same experiments in the laboratory, which prepares students for further study in chemistry upon arrival at Southern.

See ACADEMY, page 2

CHEMISTRY CLUB CARVES PUMPKINS

At left, Amy Castillo holds her pumpkin carving during the recent Chemistry Club event. For more photos, see page 3.

Dynamic equilibrium must continue to be stressed, readjusted

Brent Hamstra

Henri Louis Le Châtelier said that if a stress is applied to a system at equilibrium, the system will react in a way that minimizes or counteracts that stress. While this principle was expressed in reference to chemical systems, the principle has been applied in a number of other fields as well.

Life in the Chemistry Department illustrates that principle well. Each year, students graduate, and summer brings stress as we remember our graduates and the ways that they have contributed to the life and work of the department. We wonder how we'll get along without them. The end of the summer brings relief of that stress as new students arrive and other students return to take on new responsibilities and contribute new perspectives.

Chemical equilibrium is not a static state; it is a dynamic phenomenon. In living systems, that dynamic equilibrium must continue to be stressed and readjusted, otherwise the organism dies. Growth requires a certain amount of resistance to achieving equilibrium. We've been blessed to have some growth in the Chemistry Department during the past couple of years, despite the forces at work to drive down total enrollment at Southern. Our majors have grown from 81 two years ago to 88 at the beginning of this fall semester, close to the record high of 94 majors in 2012. We've done this through building a reputation for high-quality teaching that puts students in position to reach their professional goals, and for doing this in a way that promotes a strong sense of community and identity among our majors and faculty. Most importantly, we do this without compromising our Biblically-based Seventh-day Adventist values and worldview.

If we want that growth to continue, we'll need to continue to innovate. So we're working on developing new approaches to provide information and opportunities to high school students who may be interested in chemistry and reaching out to high school faculty locally and in the Southern Union to partner with them in education. We are looking for ways to broaden and enrich the education our students receive in the classroom and in the laboratory.

If you have ideas about things we can do, let us know. The give-and-take of ideas, after all, is another manifestation of a healthy educational equilibrium.

Academy

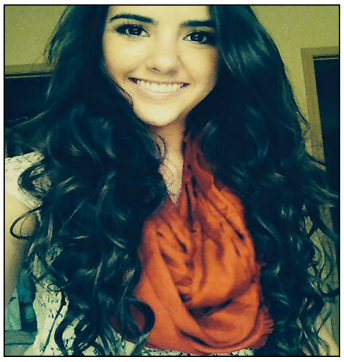
Continued from page 1

This dual-enrollment extension course began during the 2013-2014 academic year as General Chemistry I with three students, two of whom enrolled in and successfully completed General Chemistry II at Southern during the winter semester of 2015. During the 2014-2015 school year, eight students successfully completed the full General Chemistry sequence at GCA, and six of those students have started studies at Southern this fall. This fall, 13 students have started General Chemistry I at GCA.

Students at GCA benefit from this course because they can begin fulfilling requirements for majors requiring chemistry prior to attending Southern or apply the credits earned toward general education requirements in science. The Chemistry Department has also benefited from this arrangement as well. Three of the students who have taken part or all of the General Chemistry sequence at GCA are now chemistry majors at Southern, and all of these students have been able to use this experience to help them gain employment by the Chemistry Department in various capacities.

"We appreciate the opportunity to collaborate with academies and high schools to enhance the quality of the chemistry instruction they provide to students," says Brent Hamstra, Chemistry Department Chair. "While it may not be possible for every secondary school to offer dual-enrollment courses, there may be other ways in which we can partner with interested institutions to assist in ways that are mutually beneficial and meet student needs."

December 2015 graduates



Jessica Davis
B.S. Biochemistry
Future plans: Attend medical school

Justin Hernandez
B.S. Biochemistry
Future plans: Attend medical school

Megan Holladay
B.S. Chemistry
Biochemistry
Future plans: Pursue a job in the chemistry field

Preston Palm
B.S. Biochemistry
Future plans: Attend medical school in July

Tamie Suzuki
B.S. Biochemistry
Future plans: Research in Medicinal Organic Chemistry, then attend graduate school

CHEMISTRY CLUB CARVES PUMPKINS

At left, junior financial management major Jonathan Bahn holds up the "brains" of the pumpkin, known as the fibrous strands and seeds, while freshman biochemistry major Marissa Chang removes the pumpkin stem during a recent Chemistry Club event. Above left, senior biology major Cathleen Thompson carefully carves the likeness of Tinker Bell into her pumpkin.

Students enjoy new tutoring courses in Chemistry

Service-learning classes help students meet their requirements and aid others

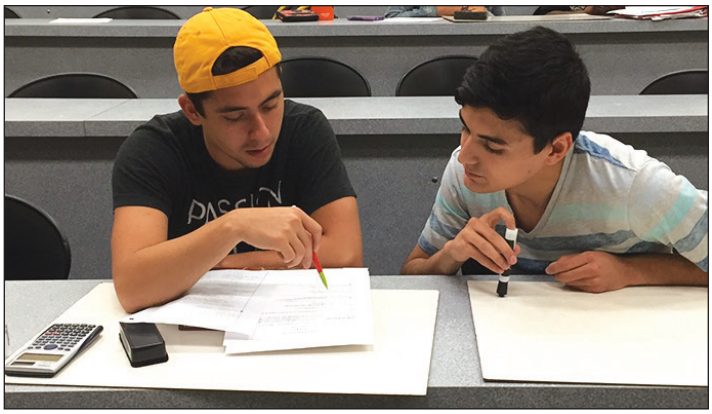
By Jan Cathey

Southern Adventist University's mission is to "nurture Christ-likeness and encourage the pursuit of truth, wholeness, and a life of service."

The Christian Service program was established to help students become aware of their talents and ability to provide service to others in the community. Our students are required to complete service learning goals to obtain their degree. Three experiences in community service and two experiences in service-learning are required. The community service requirements can be achieved by several means. Students can participate in the many campus-wide community service days, weekly outreach ministries, or other approved student organization activities. The service-learning requirements can be fulfilled by a Uquest mission trip, a student-initiated project, or by taking service-learning courses. Some of our chemistry majors elect to travel to foreign countries where they spend two semesters teaching and helping others to meet the service learning requirement. For students who prefer to not take time off from their studies, the Chemistry Department decided to help them meet their service learning requirement by creating two chemistry-related service-learning courses.

Tutoring Chemistry 205 and 305 were created to help students develop their tutoring skills and give them the opportunity to provide service to the community. Each course requires 15 hours of tutoring throughout the semester. This tutoring is voluntary.

In the Chemistry 205 course, the students tutor other students in General Chemistry and Survey of Chemistry. The students taking the tutoring course learn research-based teaching methods that have been proven successful in the chemical education



Sophomore allied health major Manny Onate, left, and senior biophysics major Albert Gonzalez prepare for an examination in General Chemistry.

WHAT TUTORS SAY

"Tutoring class has been an excellent opportunity to both apply the chemistry education I have received and further develop my interpersonal skills. The joy I receive when a student can understand how and why to solve a problem is unmatched."

"When I sat down with my student today, I noticed a considerable improvement in his approach to chemistry in general. He seemed to be more confident when tackling problems. After several weeks of learning what methods of teaching speak to him the best, I have noticed that the methods I am using now are clicking with him a lot faster. It is extremely rewarding to see his improvement week by week. I know that he will continue to improve and use the methods he has learned in this course to be successful in his future."

"For me, tutoring others helped me realize how much I need to learn myself. As I am teaching, I am constantly reminding myself about concepts I haven't looked at in years."

"I enjoy the structure of the class- as soon as we learn a valuable teaching method, we are able to apply it to our tutoring session right away."

WHAT STUDENTS SAY

"I enjoy going to tutoring because the tutors help me understand the basic concepts I may have missed during my lecture class. Instead of going fast-paced, tutors take the time to let me think about the problem before jumping in. They work with me at my pace as I struggle with math. The tutors also help me learn the formulas and tell me which formulas I should memorize. Overall tutoring is helping me to succeed in General Chemistry. Thank you."

"There are times in class where I don't always understand the material. There are about 50 minutes in class for one professor to speak to 70-plus learning college students and teach them about the material that is covered in a chapter. At times the material can be hard to understand, but going to tutoring has really helped me. Tutoring allows for students to have one-on-one time with a chemistry tutor and focus on the material the student needs help with while at the same time going at the same pace and learning style of the student. The best thing about tutoring is that it revolves around the student in order for them to understand the material, receive answers to questions about a section, and excel in the class."

Senior biochemistry major Brad Beisiegel, left, and sophomore nursing major Javon Sonnier-Sellers review mole fractions of gases during tutoring for General Chemistry class.

community. Students are taught the basic learning theories and learning styles. They are trained to use effective teaching strategies such as Socratic dialogue, concept modeling, and scaffolding. Common chemistry misconceptions are addressed and students are taught proven approaches. As a final project, the students are required to work in groups to make a 5-minute video tutorial using education strategies to aid students with some of the most difficult topics of introductory chemistry.

In the Chemistry 305 course, the students offer tutoring in Survey of Health Chemistry and Organic Chemistry. These students learn concepts that build on the previous knowledge gained in Tutoring Chemistry 205. The students in this class are required to tutor in large groups of five or more students. They are required to design and present a lesson that will prepare students for an upcoming exam.

At the end of every tutoring session, the tutors are required to reflect on the session. They are asked to focus on the educational strategy they decided to implement and to describe the successes and failures they experienced.

Chemistry professor reflects on tutoring program

"As the instructor of both courses I find it is such a privilege to work with our chemistry majors and to help them see how they can use their abilities and talents to provide service to others.

Many of the tutors spend many more hours tutoring than the 15-hour requirement for the semester. Watching the students tutor and help other students gain mastery in chemistry is a true blessing. The tutors come to me and share how excited they are when they discover their ability to help others.

As I read the reflection comments during the semester, it is inspiring to see how the tutors grow from just showing their student how to solve a problem to coaching their student into solving the problem for themselves. I also am blessed by watching the students being tutored grow in their academic ability as well. Our class motto is to tutor using methods so that eventually the student will not need tutoring and to help them become self-sufficient learners so that they are not only successful in chemistry but in other courses as well.

I know if my students succeed in this then they are a true blessing, and their efforts will have the ability to change a life."

— Jan Cathey, associate professor of chemistry

BIBLICAL APPLICATION

Jesus is the Catalyst

By Mitch Menzmer

Chemistry is largely a study of material transformations. Liquids are converted into gases and solids into liquids. Under conditions of very high pressures, supercritical fluids are formed.

In chemical reactions, molecular rearrangements give rise to new substances with physical and chemical properties uniquely different from the original substance or substances. In every case of transformation — physical or chemical — the driving force involves a flow of energy. Achieving a desired transformation involves coaxing materials down the right energy pathway. Energy barriers impede that flow, introducing inefficiencies in the transformation process.

As chemists, our work often involves minimizing these inefficiencies by altering conditions. And so we find ourselves changing concentrations of reacting materials, removing products formed so as to enhance formation of more product, varying temperature or pressure and changing solvents — all as a means of goading a process over whatever energy barrier may be of hindrance.

The angst of this process brings to mind a passage in the Gospel of Mark describing the disciples' navigation across the Sea of Galilee, "they were making headway painfully, for the wind was against them." (Mark 6:48)

An ideal means of overcoming the energy barrier in material transformations is to find an appropriate catalyst — an additive that provides an energy pathway with a substantially lowered energy barrier.

The effect of a catalyst on the rate of a process can be astounding — having an almost supernatural influence on the transformation process.

In the case of the disciples facing the wind, an astounding supernatural event indeed occurred when they allowed Jesus to enter into their troubles. "And he got into the boat with them and the wind ceased. And they were utterly astounded." (Mark 6:51)

ALUMNI SPOTLIGHT

Rachel Hansen, Pharm.D.

1. What years did you attend Southern Adventist University?

I started in the fall of 2002 and graduated in the spring of 2006.

2. What attracted you to Southern?

The university was close to home and many of my friends attended.

3. Why did you choose to study chemistry?

Chemistry was the best degree to fulfill the prerequisite requirements for pharmacy school. I was fortunate that the department was also a family atmosphere that fostered friendships.

4. What are your favorite memories of Southern?

My friends and I were part of Something Else Sabbath School and my favorite memories are the Sabbath afternoons that we spent having potluck, hiking or playing Frisbee.

5. Where was your favorite place to study?

Third floor study area in the Hickman Science Center during chemistry tutoring hours.

Rachel (Day) Hansen with her husband, Scott.

6. What was your favorite class?

Photography was my favorite course at Southern. The course encouraged me to stretch my worldview and expand my ability to express myself. My favorite chemistry courses were my upper division chemistry lab courses where I was able to implement the concepts learned in class.

7. Tell us about your life immediately after Southern.

I became a pharmacy student at the University of Tennessee Health Science Center in Memphis, Tenn., and then in Knoxville, Tenn. I graduated with my Doctor of Pharmacy in 2011.

Since graduation, I have been employed in north Georgia as a retail pharmacist.

8. What are your plans for the near future?

In 2011, Scott Hansen and I married. This December we are expecting our first child. I'm looking forward to being the primary caregiver and transitioning into a part-time pharmacist position.

9. Can you share any experiences at Southern that helped you in your professional and/or personal life?

While I was at Southern, I worked as a tutor at Learning Success Services. This job gave me exposure to different learning styles and an opportunity to practice with different methods. Every day in patient counseling, I draw on these skills to ensure that the message intended has been heard and understood so that the patient will be applying the advice given.

10. What advice do you have for current students who want to make the most of their time at Southern?

Make friends — with people in the dorms, people who are Hickmanites, people who aren't Hickmanites, the people you work with and especially your professors. For me, Southern was a special place and time in life that was a respite. I've found that in my time after Southern it is harder to make friends and there are more responsibilities on the other side of graduation. My Southern friends have been walking a similar path and we have been a source of strength for each other.

SOUTHERN ADVENTIST UNIVERSITY
Power for Mind & Soul

Chemistry Department
P.O. Box 370
Collegedale, TN 37315
Phone: 423.236.2931
Fax: 423.236.1931
southern.edu/chemistry

New Survey of Health Chemistry class focuses on organic and biochemistry

By Rhonda Scott

The School of Nursing made a change in their chemistry prerequisite recently, and now, a single chemistry course is required.

In response to this change, the Chemistry Department has developed a one-semester course called Survey of Health Chemistry (CHEM 120) that presents the key concepts of chemistry with an emphasis on organic chemistry and biochemistry. CHEM 120 was first taught this summer during the third summer session.

In developing this course, the faculty in the chemistry department emphasized the importance for students to have some background knowledge of chemistry before beginning. A placement exam was developed to test key concepts in chemistry such as the names and symbols of the first 20 elements in the periodic table and grams-to-mole conversions. A review sheet was prepared so that incoming students would know what to expect on the placement exam. All of the students who registered for the course passed the placement exam and nearly every student earned a grade of C or better. Two sections of CHEM 120 are being taught during the fall semester, and the students are required to complete online homework assignments.

"The online homework has helped me learn a lot," said one student while evaluating the course. "I like that the homework gave immediate feedback."