

The Magazine for ACS Student Affiliates  
September/October 2008

# in *Chemistry*

## GRADUATE SCHOOL



Through the Eyes of  
Graduate Students



## Interesting Articles

### Launching Corporate Careers

Susan J. Ainsworth reports on unexpected career opportunities that graduates with B.S. and M.S. degrees are finding in the chemical industry. *Chemical & Engineering News*, April 14, 2008, Volume 86, Number 15, pp. 55-59. <http://pubs.acs.org/cen/employment/86/8615employment.html>

### Starting Off on the Right Foot

Patricia Gosling and Bart Noordam offer proven tips and strategies for getting started on your graduate career. *Science*, October 26, 2007. [http://sciencecareers.sciencemag.org/career\\_development/previous\\_issues/articles/2007\\_10\\_26/credit\\_a0700152/\(parent\)/158](http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2007_10_26/credit_a0700152/(parent)/158)

## Interesting Websites

- <http://princetonreview.com/grad/>  
The graduate school and careers site of The Princeton Review
- <http://www.schonlau.net/>  
Tips on being successful in graduate school and successfully completing a Ph.D.

## Graduate School Web Links

Considering graduate school? Then check out these Web links:

### Research M.S. and Ph.D. Programs

**Boston College** [www.bc.edu/chemistry](http://www.bc.edu/chemistry)  
**Duquesne University:** [www.science.duq.edu/chemistry/index.html](http://www.science.duq.edu/chemistry/index.html)  
**Florida Atlantic University:** [www.science.fau.edu/chemistry](http://www.science.fau.edu/chemistry)  
**George Washington University:** [www.gwu.edu/~gwchem](http://www.gwu.edu/~gwchem)  
**Old Dominion University:** [www.sci.odu.edu/chemistry](http://www.sci.odu.edu/chemistry)  
**Oklahoma State University:** [www.chem.okstate.edu](http://www.chem.okstate.edu)  
**Rice University:** [www.chem.rice.edu](http://www.chem.rice.edu)  
**Rosalind Franklin University:** <http://www.rosalindfranklin.edu/DNN/home/CMS/biochem/BirkbeckUniversity/tabid/1412/Default.aspx>  
**SUNY-Environmental Sciences and Forestry:** [www.esf.edu/chemistry](http://www.esf.edu/chemistry)  
**Temple University:** [www.chem.temple.edu](http://www.chem.temple.edu)  
**Texas A&M University:** [www.chem.tamu.edu](http://www.chem.tamu.edu)  
**University of Central Florida:** <http://www.cos.ucf.edu/chemistry/>  
**University of Cincinnati:** [www.che.uc.edu](http://www.che.uc.edu)  
**University of Idaho:** [www.chem.uidaho.edu/gradprogs.asp](http://www.chem.uidaho.edu/gradprogs.asp)  
**University of Nebraska at Lincoln:** [www.chem.unl.edu](http://www.chem.unl.edu)  
**University of San Francisco:** [www.usfca.edu/mschemistry](http://www.usfca.edu/mschemistry)  
**University of South Dakota:** [www.usd.edu/chemistry](http://www.usd.edu/chemistry)  
**University of Tennessee:** [www.chem.utk.edu](http://www.chem.utk.edu)  
**University of Texas at Dallas:** [www.utdallas.edu/chemistry](http://www.utdallas.edu/chemistry)  
**University of Virginia:** [www.bims.virginia.edu](http://www.bims.virginia.edu)

### Professional Master's Degree Programs

**Arizona State University:** [math.asu.edu/~cbs/](http://math.asu.edu/~cbs/)  
**Rice University:** [profms.rice.edu](http://profms.rice.edu)  
**Temple University:** [www.temple.edu/psm](http://www.temple.edu/psm)  
**Towson University Forensic Science:** [www.grad.towson.edu/frscm/mg](http://www.grad.towson.edu/frscm/mg)



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**Editor** Nancy Bakowski

**Associate Editor** Lori J. Betsock  
Audley S.V. Burke

**Design & Production** Cornithia A. Harris

**Editorial Assistant** Robin Y. Lindsey

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COURTESY OF MARJORIE C. CASERIO

## The Big Decision

BY MARJORIE C. CASERIO

Perhaps you are thinking of going to graduate school. Or maybe you have already applied and been accepted. In either case, you may know that the defining feature of chemistry graduate programs, especially at the doctoral level, is original research under faculty supervision.

Your choice of a faculty research advisor will therefore have a great influence on your research experience and is probably the most important decision you will make in graduate school. In this spirit, I want to offer a few observations that may guide you in the right direction.

First and foremost, be sure to choose an advisor whose research area is of interest to you. Otherwise, it may be difficult to survive five or six years of challenging work.

But interest alone is not sufficient. Will your advisor give you the intellectual leadership you will need? Will there be funding for the project? The answers to such questions will largely depend on your advisor and his or her ability to secure research funding from external agencies. While teaching assistantships offer valuable experience and financial support, the progress of your research will be slow without some support through a research fellowship or assistantship.

Having a “famous” professor as your thesis advisor can look impressive on your CV. But you should not allow fame to dictate your choice of advisor. An even more important consideration is the accessibility of the faculty member to you. If you thrive on being independent, it may not matter if your advisor is seldom available. Most of us, however, need advice and counsel, especially when progress stalls as it often does in research.

Bear in mind also that it will help greatly if your advisor is sensitive to your professional and cultural needs. An effective mentor will encourage your professional development and uphold the principles of scientific integrity. He or she will enable you to attend professional meetings, network with colleagues, and develop communication skills needed in presenting seminars and writing research papers and proposals. It is also beneficial if your advisor can help you find additional mentors if your work is interdisciplinary or if disputes or personal issues arise.

Some aspects of advising will become increasingly important as your work nears completion. Will your advisor allow you to finish your degree within a reasonable time, or will the project drag on with no foreseeable closure? Will your advisor give you timely guidance in your thesis preparation and review your drafts promptly? Can you expect assistance in career preparation and in searching for jobs or postdoctoral positions? Will you be able to rely on your advisor for letters of recommendation when needed?

Another consideration is the size of the group. If the group is too large, incoming students may not feel they’re getting adequate attention. On the other hand, there can be significant advantages to larger groups. For example, group members help each other in ways you may not immediately realize. Postdoctoral fellows and senior graduate students can be immensely helpful to new graduate students. The group becomes a community that supports the educational and professional development of its members and provides needed socialization.

As a new graduate student expected to choose an advisor within the first year, how do you find enough answers to these questions to make an informed choice? Most graduate departments provide first-year students with helpful information, ranging from tips and hints to policies and

formal guidelines. Some departments even require you to “rotate” through several research labs for weeks at a time to gain first-hand experience of the focus and dynamics of different groups.

At the very least, you should have a conversation with your potential advisor before making a decision so that you have a clear idea of his or her expectations, how often you’ll meet, anticipated financial support, time to degree, and how to sustain a productive relationship throughout your graduate experience. You need to know what to expect of each other, maybe even to the point of a written understanding. Some of the questions may be difficult to ask the faculty member face-to-face, but you can usually find answers from other students, particularly senior graduate students in the group, postdoctoral fellows, and others in the department. They can provide valuable insights into how faculty manage their groups.

In conclusion, remember that your selection has to be reciprocated by the advisor. Don’t be dismayed if your initial choice is not honored. There may be very good reasons why the faculty member cannot accept another student at the present time. Remember also that if the relationship with your advisor doesn’t work out, you can change advisors — and the sooner you do, the better.

It is far more likely that you will make an excellent choice at the outset that will benefit both you and your advisor and assure you of a great experience in graduate school and the promise of an exciting career. I wish you all that and more. **tc**

**MARJORIE C. CASERIO** is Professor Emeritus in the Department of Chemistry and Biochemistry, University of San Diego. She is also a consultant to the ACS Office of Graduate Education and editor of the Graduate Education Newsletter.

Share what's going on in your chapter! If your chapter would like to be featured in the Chapter Spotlight, please contact Audley Burke at 800-227-5558, ext. 4565 or e-mail [a\\_burke@acs.org](mailto:a_burke@acs.org).

COMPILED BY AUDLEY BURKE

## University of Arizona Tucson, AZ

Chapter president: Danielle Correia

Number of chapter members: 130

Number of ACS Student Affiliates: 14

Institution environment/  
composition: Large; public,  
urban; minority serving; 4-year  
institution

Website: <http://www.chem.arizona.edu/saacs>

### Q What is your most successful recruiting event/method?

**A** Our SAACS chapter always sets up a booth at the annual campus-wide club fair, where people come by our table and talk with officers and members. The table is complete with chapter posters and boiling concoctions of dry ice in a food coloring solution, which always gets lots of attention.

### Q How do you retain members from year to year?

**A** We retain members each year by being a welcoming and active chapter. Some members simply enjoy coming to meetings to hear our speakers, while others are more involved. Members form close relationships with each other as they participate in a myriad of activities, from judging science fairs to learning how to 'live more greenly' at Tucson Household Hazardous Waste (an ongoing volunteer project).

### Q What is the most unique activity your chapter sponsors?

**A** Our chapter sponsors the annual Pie-in-the-Face Chemistry Department Barbecue, a fundraiser for the chapter where we sell points that go towards 'pie-ing' a professor, TA, or student. Whoever accumulates the most points gets a delicious whipped cream pie in the face at the barbecue. It's a



UNIVERSITY OF ARIZONA

fun departmental tradition, and it's a great venue for members to interact with professors and graduate students within the department.

### Q What is your most popular chapter activity?

**A** Our club social events are very popular, ranging from bowling, to visiting the planetarium, to hosting our end-of-semester fiesta. The most popular activity of the chapter is the annual trip to the ACS national meeting in the spring. Sending as many students as possible to this event is the primary goal of the fundraising, and is something the students look forward to yearly.

### Q What is your most successful fundraiser to date?

**A** Our most successful fundraisers have been the Pie-in-the-Face Barbecue and selling ACS General Chemistry Study Guides. Our Pie-in-the-Face event can raise up to \$1,500 dollars, and the sales of study guides and lab notebooks raise thousands more yearly. As a result, the chapter was able to send over 10 students to last year's ACS national meeting in New Orleans, as well as host a number of departmental activities.

### Faculty Advisor John Pollard, 4 years

#### Q Why/how did you become a faculty advisor?

**A** The former Student Affiliates faculty advisor retired, and I assumed the role.

#### Q What is your role as a faculty advisor?

**A** I attend the officer meetings, general chapter meetings, and events. I make sure the chapter stays on track with its goals and try to guide the students as they progress.

#### Q What challenges have you faced in your position?

**A** Not too many. I have been fortunate to have outstanding members for the four years I have been the advisor. I have had to mediate some conflicts within the chapter, but these have been minor policy issues. Overall, I have had a great experience!

#### Q What has been the most rewarding aspect of your service as a faculty advisor?

**A** Success with outreach programs. I am very proud of the dedication and hard work that the active members have put into chapter activities.

#### Q What was your most memorable experience while attending an ACS national meeting?

**A** The most memorable experience at an ACS national meeting was seeing the chapter receive the Outstanding Chapter Award in New Orleans. I was very proud of the students' accomplishments.

#### Q What advice can you offer those new to the advisor position?

**A** Try to create a sense of pride among the members of the chapter. This can be a great motivating factor for success.

## QUESTIONS ABOUT THE STUDENT AFFILIATES PROGRAM?

Call 1-800-227-5558  
and ask to be  
connected to:

- Robin Y. Lindsey (x4480) for general information and chapter activation
- Audley Burke (x4565) for information on chapter grants, retention, and recruitment
- Lori Betsock (x6188) for information on internships, study abroad, careers, and graduate school



WESTERN KENTUCKY UNIVERSITY

## Western Kentucky University Bowling Green, Kentucky

**Chapter president:** Rachel Baumgardner

**Number of chapter members:** 56

**Number of ACS Student Affiliates:** 24

**Institution environment/ composition:** Large; public; urban; 4-year institution

**Website:** <http://www.wku.edu/chemistry/chemclub/>

### Q What are some of the interesting ways your chapter recruits its members?

**A** We conduct a wide range of successful activities including outreach programs (helping Boy Scouts, Girl Scouts, and Cub Scouts earn chemistry badges), fundraising events (participating in Relay for Life, Up 'Til Dawn, Big Brothers/Big Sisters College Bowl for Kids' Sake, and hosting our own bake sale), and professional development opportunities (organizing graduate/professional school visits and sending members to present research at the local, state, and national levels). Last year, more students than ever participated in our regular meetings (30-50 students) and in chapter events.

### Q How do you retain members from year to year?

**A** The key to maintaining the chapter's momentum is coming up with new activities. The focus of each year, whether it's community service, social activities, or professional development, depends on what the members want.

### Q Does your chapter participate in National Chemistry Week (NCW)?

**A** Our chapter has attempted to find creative ways of combining chemistry demonstrations and other activities to celebrate NCW. In the past two years, we performed interesting demonstrations at Shrinky Dinks inside the Greenwood Mall of Bowling Green for parents and their children who were shopping. In this event, more than 30 volunteer members from our chapter served over 120 children. During the last NCW, our chapter also made more than 300 cups of free liquid nitrogen ice cream on campus.

### Q Does your chapter attend non-ACS meetings?

**A** Our chapter always encourages its members to present their research at local scientific meetings. Many of our members attend the local scientific meetings once or twice a year. Last year, four students attended the Kentucky Academic Science Meeting and five members gave poster presentations at

the Western Kentucky University Student Research Conference.

### Q What innovative methods of communication are used to inform members of chapter activities?

**A** In fall 2007, our chapter began to use Blackboard as our primary means of chapter communication. So far, we have over 60 active members and faculty on our chapter's Blackboard site where we post important announcements, schedules for meetings and major events, and meeting minutes. We also post important documents about our chapter, along with activity reports and pictures. Our faculty advisor and student officers can also reach each member by e-mail through the Blackboard. Because it gives each member easy access to chapter activities, we have found this method of communication to be extremely efficient and powerful.

### Q What is your most successful fundraiser to date?

**A** In 2007-08, we formed a team with eight chapter members for the American Cancer Society's Relay For Life, and we raised a total of \$1,100. This year, we formed three teams (two student and one faculty) to participate in the Big Brothers/Big Sisters College Bowl For Kids' Sake (\$550 raised). Last December, the chapter held a bake sale and accepted donations at WKU, and a total of \$650 was raised to buy Christmas gifts for 22 adopted children at Warren Elementary (Bowling Green), including clothes, shoes,

and toys. Several chapter members assisted with a chili supper event, at which we raised about \$200.

### Faculty Advisor Rui Zhang, 2 years

### Q What is your role as a faculty advisor?

**A** To realize and inspire our students' talent to serve our community; help them develop organizational, administrative, and leadership skills; and foster professional development.

### Q What challenges have you faced in your position?

**A** At the beginning, the question of how to gain the trust of my officers and students represented a challenge. It took some time to find a good way to interact with them and oversee governance of the chapter and maintenance of records. Persuading freshmen to become Student Affiliates also was not easy for me.

### Q What has been the most rewarding aspect of your service as a faculty advisor?

**A** I really take pride in our chapter's accomplishments over the years. In the last four years, our chapter has consecutively earned two Honorable Mentions, one Commendable, and last year, for the first time, we received one Outstanding rating from the national office. Our chapter also received funding from ACS to host the undergraduate program in 2008 Southeast Regional Meeting of ACS in Nashville, TN.

### Q What was your most memorable experience while attending an ACS national meeting?

**A** Attending the ACS Student Affiliates Awards Ceremony in the past two years made me very proud of my students and my role in the chapter.

### Q What advice can you offer those new to the advisor position?

**A** Remember that students have enormous talent and energy. As an advisor, these are tremendous resources to tap into. **EC**

## GOT FACEBOOK?!

We have developed a Facebook page, complete with group and fan pages. Student Affiliates can access this page to learn about happenings at ACS, view pictures from meeting events, and network with Student Affiliates nationwide.

Just look up Audley "SAPROGRAM" Burke in the search box and send us a friend request

**Why Wait? Join Now!**

# Learning to Lead



BY SONJA BROOKS AND DANIELLE POLICARPIO

**B**ECOMING A GOOD LEADER is a difficult task, as most Student Affiliates have learned through experience. We, along with five other Student Affiliates leaders, were fortunate enough to travel to Dallas, Texas in January 2008 to attend the ACS Leadership Institute.

This new two-and-a-half-day event is designed for current and emerging leaders in ACS programs and groups, including local sections, divisions, national committees, younger chemists, Student Affiliates, and regional meetings. The event offers practical courses and networking opportunities to help participants lead more effectively, both as ACS volunteers and as chemical professionals.

## Connecting with the presidential succession

During the conference, we met with many great leaders of ACS local sections, who taught us skills and gave us ideas on how to improve our chapters ... and who can provide better insights than the ACS presidential succession? We Student Affiliates were given several opportunities to talk with ACS President Bruce Bursten, Immediate Past President Catherine Hunt, and President-Elect Thomas Lane. Throughout the weekend, we were able to discuss several ideas with these and other ACS leaders. It was awesome to see first-hand that the presidential succession really cared about what we were doing with our chapters and looked forward to seeing how we would grow.

The ACS leaders were very encouraging of our chapter's involvement with K-12 classes. They stressed the importance of helping young students understand that chemistry is not only important but also fun, and that it involves far more than just mixing chemicals together. We were encouraged to develop programs to bring fun experiments into elementary and middle school classrooms. Meeting the presidential succession, and being able to put a face with



Student Affiliates network with local section leaders.

all those names we have read through many e-mails, were unforgettable experiences ... and reminders that there are others who share our goal of making the world a better place through the use of chemistry!

## Tapping into the network

Throughout the weekend, we had many opportunities to socialize and network with chemists from every part of the country. We attended a networking session hosted by the Younger Chemists Committee, where we learned the importance of meeting new people, gathering business cards, and staying in touch with our new contacts. This experience was invaluable, as it allowed us to see how many options we have ahead of us.

## Leadership Training — Coming to a Meeting Near You!

Where	When	What
<b>Western Regional Meeting</b> Las Vegas, NV	Friday, September 26	Innovation Leading Change
<b>Southwest Regional Meeting</b> Little Rock, AR	Wednesday, October 1	Innovation
<b>Southeast Regional Meeting</b> Nashville, TN	Friday, November 14	Involving Volunteers

**Extra Tip:** Consider taking an on-line course at [www.acs.org/professionaldevelopment](http://www.acs.org/professionaldevelopment)



Meeting chemists who work in a wide variety of positions was also beneficial. As students, we are most familiar with a chemist's role in academia – that is, being a professor and leading a research laboratory at a university. During the conference, we met chemists from different backgrounds including chemical, pharmaceutical, and instrumentation companies as well as those working in government and state laboratories. These chemists have different working environments than those who hold academic positions. It was very interesting to hear each person's reasons for entering into one area of chemistry over others. These discussions prompted us to start thinking about what we would like to do for our own careers.

The people we met during the conference were all willing to answer our questions and help us figure out what we want to do in the future. Since we are nearing the point of applying to graduate schools or professional schools, it was good to hear other people's experiences. Plus, several people we met offered to keep in touch in order to continue giving us advice and answers to our questions. These contacts will be very helpful during the next few years.

### Learning leadership skills

One of the greatest challenges we face as SAACS chapter officers is to generate interest and excitement about our activities and meetings. We found great enthusiasm throughout the conference, and realized that it was inspired by the leaders of the meetings and sessions. There was an emphasis on the importance of volunteerism and getting others to become more involved. The simple fact that practically all those involved in leadership roles in ACS (including the

**“At the end of the weekend, I was standing with a group of other Student Affiliates, and we had a chance to speak with Tom Lane one last time. He spoke encouragingly of how the future of ACS depended on us, and how we could really influence others through our leadership. We were inspired, and soon agreed that each of us would go back to our chapters, reach out to local elementary schools, and collaborate with other chapters.”**

— *Danielle Policarpio*

presidential succession) are all volunteers still continues to astonish us – especially considering all the work that they do on top of their day jobs!

The two courses that we attended – “Working with Volunteers” and “Innovation” – gave us insights into new ways to approach issues we face in our chapters and in our lives as chemistry students. Throughout these courses and other sessions, we learned how to involve and organize our members, generate innovative ideas, and successfully plan and implement events. We also learned that we need to become more involved with our local ACS sections and schools in our respective regions – and that we need to start taking advantage of the many resources available to us.

### Inspiring our chapters

Before the conference, we had felt that a major problem facing all the Student Affiliates leaders is a lack of involvement and motivation among chapter members. Now that we are

back at our schools, we are excited to share our experience, and ready to get to work with our SAACS chapters!

The ACS Leadership Institute helped us and the other Student Affiliates who attended become better leaders for our chapters. We have found many new ways to improve our chapters, motivate members, and make volunteering more enjoyable.

We will surely use the skills we gained during the Institute throughout our careers, and we are excited to have made so many friends within ACS. Most importantly, we are keyed up and ready to continue promoting the fun of chemistry to our peers and communities. **IC**

## 2009 Student Affiliates Leadership Awards Offered

Want to improve your management and leadership skills? Apply for a 2009 Student Affiliates Leadership Award! This award covers your travel, accommodation and registration expenses for the 2009 ACS Leadership Institute to be held January 23-25 at the Omni Hotel in Fort Worth, TX.

This is an excellent opportunity to witness first-hand the qualities successful leaders possess. Meet and network with Younger Chemists Committee members and national, local section, and division leaders. Learn how to plan events, raise funds and effectively communicate.

For more information go to [www.acs.org/saprogram](http://www.acs.org/saprogram) or e-mail [saprogram@acs.org](mailto:saprogram@acs.org)

**Deadline for Applications:  
November 14, 2008**

**SONJA BROOKS** is a senior chemistry major at the University of Alabama at Birmingham and president of the UAB SAACS chapter. **DANIELLE POLICARPIO** is a junior chemistry major/physics minor at the University of Nebraska at Kearney and president of the UNK SAACS chapter.

# COMPETITION, COLLABORATION, CELEBRATION!

## Hosting a Creative Chemistry Field Day

BY LINDSEY R. CULLEN

**F**ORGET THE RECENT SUMMER Olympics in China for a moment, and get ready for a different kind of competition ... chemistry style!

Does your Student Affiliates chapter have what it takes? If so, maybe you should challenge a local Student Affiliates chapter to a little friendly contest. That's exactly what the SAACS chapter at the University of Detroit Mercy (UDM) had in mind when we hosted our first annual Chemistry Field Day. With the help of an Innovative Activities Grant (IAG) from ACS, the UDM Chemistry Club was able to invite the neighboring SAACS chapter at the University of Michigan–Flint (UMF) to our campus for a Saturday to compete in feats of chemical knowledge and laboratory skills, as well as friendly discussions about chemistry club events.

### How it all began

As UDM Student Affiliates Chapter president I, along with many of our members, was somewhat disappointed with the poor attendance at the Detroit Local Section Student Affiliates research meetings. These meetings were the only opportunity that our members had to meet other Student Affiliates from our local section; however, it was held during lecture and laboratory course times. To address this shortcoming, we developed an idea to hold a fun, social event on a Saturday with the purpose of meeting other Student Affiliates and possibly spurring opportuni-

ties for collaborative projects in the future. Our members, and the Student Affiliates at UMF, were very excited about the idea of a Chemistry Field Day, and it was easy to get a few members to plan the creative events of the competition.

### Planning tips

A major challenge of planning a large collaborative event like this one is communication between the two Student Affiliates chapters. Luckily, we started planning early. The president and the advisor of the UMF SAACS chapter were extremely helpful, and I was impressed how quickly they answered their e-mail! Another difficulty was timing. We held



Students go head-to-head in the analytical calculation relay.

the event on a Saturday in mid-November, but unfortunately a number of students were preparing for exams and were unable to attend. The next time we hold this event, we plan to hold it earlier in the semester.

### Head-to-head chemistry

Held on Saturday, November 10, 2007, our event attracted roughly 25 Student Affiliates from UDM and UMF, as well as the SAACS advisors. Using the grant money from the IAG, we were able to purchase a nice buzzer system for our Chemistry Quiz Bowl competition. Professors from both schools contributed questions regarding general, organic, and basic biochemistry. The competition was very close but in the end, the UDM team came out ahead.

Next, everyone was escorted down to a teaching laboratory for the Analytical Calculation Relay. This event featured two teams of five calculation-savvy members, who

**LEARN MORE  
ABOUT INNOVATIVE  
ACTIVITIES GRANTS!**

**UDM's Chemistry Field Day was made possible in part by an ACS Innovative Activities Grant (IAG). For more information, go to [www.acs.org/saprogram](http://www.acs.org/saprogram) and click on Chapter Resources.**

each performed a crucial step in converting and calculating concentrations, buffer systems, acid-base equilibria, and pH. For example, the first person had to calculate the concentration of one solution, while the student handling the “second leg” of the relay had to use that answer in a dilution. When neither team arrived at the correct answer originally, the two teams were allowed to work together to solve the problem. The UMF team won this event, completing the calculation first.

National Chemistry Week, career workshops, and community service events. Our club members were happy to pick up a few tips about planning our upcoming alumni event, since UMF had just recently held a similar event. Also, everyone agreed that there should be a Chemistry Field Day event next year, held at the UMF campus. This lunch was a perfect setting for an unprecedented accomplishment: bringing together a room-full of Student Affiliates from both our universities to talk about chemistry.

difficult end point: a color change of dark purple to dark blue. The UMF team excelled in this competition and provided an extremely accurate answer.

Next on the agenda, the basement of the UDM chemistry building was transformed into a Dry Ice Curling Arena, where we had created a target on the nicely waxed floor using masking tape. We gave members of both teams blocks of dry ice and everyone was allowed to practice a few throws. I was told that the UMF chapter was very serious about this event, and had practiced carving the perfect shape the night before. In the end, the UDM team succeeded.

To end the Chemistry Field Day, we held another intense round of Chemistry Quiz Bowl, in which a few new members from both teams participated. The scores were close and, in the final round, UDM pulled ahead.

### And the winners are ...

The winning team of such a taxing competition deserved a pretty nice trophy. We had the idea to perform a Tollens reaction in a 200 mL separatory funnel. After a few tries, a beautiful mirror coated the inside, creating a unique chemistry-based award. Following the final quiz bowl, the points from all of the day's events were counted and UDM was determined the winner of the event. The trophy was presented and both teams provided congratulations.

The Chemistry Field Day event was not only fun to plan and participate in, but provided a great atmosphere to make some new friends and break the ice for future collaborations. These competitions are a great way to have fun with chemistry, and we are looking into ways to possibly adapt them for the undergraduate program at a future ACS national meeting. 



Teammates watch as a University of Michigan-Flint student takes aim during the curling competition.

### The Lab Olympics

After lunch, the Lab Olympics portion of the competition began. The first competition was an elaborate “Weigh Off” in which five members of each team were asked to estimate, by eye, the weight of a given sample of sand, when provided with only a 1.00g standard. As an



Gavin Ambrosi and Salette Martinez work as a team in the titration competition.

addition to this competition, the same idea was translated to estimating a volume of water in a separatory funnel. This event was very entertaining, and both teams had instances of surprising accuracy and extremely bad estimations! In the end, the UDM team just barely won this event.

The Titration Competition required both teams to determine the molarity of an EDTA sample by a complexation titration. We chose an EDTA titration because the eriochrome black indicator had a

The next competition, the Acid-Base Scramble, was my personal favorite. Each member of the team was given a sheet of paper with a printed molecule on it, and both teams had to align themselves according to  $pK_a$  from highest to lowest. When neither team was able to identify the right order initially, they were told simply that their order was wrong and were allowed to deliberate about which structure was out of place. This event was very fun, and it was great to see all of the students get into heated debates about the acidity of one molecule over another. The UDM team won after a few unsuccessful attempts by both teams.

### Time for networking

After the morning event we provided lunch, during which our members met, chatted, and shared ideas about chemistry club events in a non-competitive atmosphere. We discussed demos for



LINDSEY R. CULLEN is president emeritus of the University of Detroit Mercy Student Affiliates Chapter.



## Deciding to go or not to go?

The first step, of course, is deciding if graduate school will further your career goals. This will depend on what you see as your long-term career plans. If you think that academia is in your future, then a Ph.D. is a must. If your career plans are focused on entering the chemical industry, you might take a job right after completing your B.A. or B.S., but an advanced degree may become important for potential advancement. In many industrial settings, only those with advanced degrees will be considered for management tracks and other leadership roles.

Let's assume that, whatever your reasons may be, you do want to go to graduate school. Now what? You probably have many questions, and a limited amount of time to plan your way forward. If so, here are a few answers and pointers to help you through the process.

## How to choose which schools to apply to

Once you have decided that graduate school is part of the career path for you, the next step is to pick the schools to which you want to apply. But how should you choose? At present there are approximately 170 schools that offer advanced degrees in chemistry. Depending on your situation, many factors may influence where you consider attending school, including family obligations or work constraints that place geographical restrictions on you (e.g., your company is paying for you to attend a graduate program, etc.).

However, the single most important factor in deciding those schools to which you should apply is the research focus (or foci) of the faculty. For each school you consider, you need to ask: "Are the faculty engaged in the type of research that I am interested in doing?" If you are not sure what area of research you want to pursue, then probably a bigger school is better for you, since it will tend to offer a broader range of opportunities.

How do you find out what faculty at the schools are investigating? Go to graduate school fairs, carefully look through departmental websites, and call or e-mail the department to request information on their graduate programs and faculty. It is good to do your homework at this stage, because once you decide to go to graduate school, you (and the school) are making an approximately five-year commitment. You want to make sure you are going to the place that is best for you. By the way, it also wouldn't hurt to e-mail the specific faculty members with whom you are interested in working. Most faculty love to talk about their work with prospective

students, so drop them a note! Sending form e-mails to faculty, however, should be avoided.

## What should go into your applications?

Luckily, most applications for graduate schools are about the same, so you will be able to recycle some of what you prepare for every school. Pay attention to the deadlines ... and APPLY EARLY! Why? Many programs have additional fellowship funds to award, depending on the program, and when you apply early

# THE GRADUATE SCHOOL PROCESS

BY JAMES BATTEAS

*For many students, the prospect of going to graduate school can be daunting. Here I discuss some simple guidelines to help you through the process of making decisions about graduate school.*

you have a better chance of being considered for these fellowships. At the very least, apply on time. Graduate recruiters and admissions committees may regard late applications as a lack of commitment or organization on your part, and these intangibles may make your application less competitive.



### Fees

Be prepared to pay, as you will encounter fees along the way. Each time you take the Graduate Record Examination (GRE) costs around \$140, for example. On top of these costs, there may also be application fees for the graduate programs you are considering, meaning that applying to six or seven schools could cost you as much as \$600! If you can't pay the fee, ask the program if the fee can be waived or reduced. It never hurts to ask.



### Grades

Almost all graduate school applications will require transcripts from ALL schools you have attended. That includes that the local community college where you may have taken classes while home for the summer.

Make sure that you request all of the transcripts in time to arrive by the application deadline (or earlier), as applications may be considered incomplete without them, and thus not get reviewed. In terms of grades, most graduate programs require a B average or better (3.0/4.0) to gain admission. Your application will be especially strengthened by good grades in your upper division courses. In fact, many places consider these grades more heavily than those in your first two years.



### Entry exams

You will also need to submit scores from the GRE. Check to see which exams are required by the schools to which you are applying, and learn their typical score requirements for admission. Not all schools require the subject test, but some do. Plan accordingly to have these exams completed in enough time for the scores to be reported before the application deadline.

If you are applying for admission in the fall, you should really target taking these exams by September of your senior year. If you are applying for spring admission (i.e. January or February), then you will need to have your GREs done by May of the year you graduate to receive your scores in time. Check with the schools to which you are applying to see whether they will consider applica-

tions for spring admission (some may not). If you are an international student, you may also be required to submit scores for the Test of English as a Foreign Language (TOEFL). Again, you want to make sure that these scores are reported in time for the application deadline.

### Personal statement

Every school will require you to submit a personal statement, in which you should succinctly describe what you have done to prepare for graduate school. You should take this part of the application very seriously. Here are a few tips for success:



### Letters of recommendation

Most programs will request at least three letters of recommendation in support of your application. These letters should come from faculty or employers who can speak to your experience in chemistry. You should include letters from faculty who have taught you in class or with whom you have done research. Make sure that you ask for these letters at least a month in advance.

Take the time to sit down with any letter writers who don't know you well to discuss your career aspirations. Prior to your meeting, give them a copy of your current résumé. If you don't have a résumé, learn how to create one now. As you begin to enter the professional workforce, an up-to-date résumé is a must, and many schools have services to help you prepare one (see the sidebar about resources, below). This will help your letter writers provide a more meaningful assessment of your background and goals to the admissions committee. Also, don't hesitate to bug your letter writers and remind them of upcoming deadlines.

### Which school is right for you?

If you are lucky enough to be admitted to more than one program, then you face the tough task of narrowing down your options to one program. How do you decide?

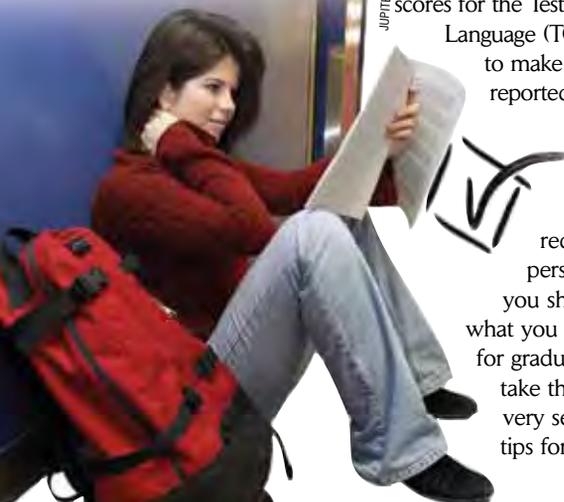
**Articulate your personal goals.** Explain to the admissions committee why they should make you an offer to come to their school. Describe your career goals and what area(s) of research you wish to pursue. Take the time to outline the relevant coursework you have taken to prepare for advanced studies.

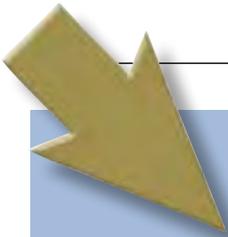
**Describe your undergraduate research.** Many places will not strongly consider applications from students with no research experience, so if you have not been involved in research yet, *do so*. This research can come in many forms, ranging from participating in research at your home institution, to going away for the summer to participate in a Research Experiences for Undergraduate (REU) program. The National Science Foundation maintains a list of schools with active REU programs on its website. Also, many schools, companies, and national labs offer summer programs that are internally supported, so check with them. No matter how you get it, *research experience is a must* for getting into a good graduate school. In your personal statement, you should relate your overall experience to the committee.

**Explain your extracurricular activities.** In addition to research, if you have been involved in clubs or other activities that have allowed you to develop leadership skills (e.g., serving as secretary of your local ACS Student Affiliates chapter, etc.), this is also useful to describe to the committee.

**Research the faculty.** Take the time to tell the admissions committee under which faculty members you are most interested in studying. This shows the committee that you have done your homework and that you have thought about what you want to do. As a rule of thumb, you should be sure there are at least three faculty members whose research interests you, since admission to a doctoral program does not guarantee you admission into a particular faculty member's group.

JUPITERIMAGES






## CHECK OUT THESE RESOURCES FROM ACS

**Graduate Education in Chemistry** — Information about resources, planning for graduate work in chemistry, and more! <http://acs.org/education> and click on Graduate Education.

**DGRweb** — The ACS Directory of Graduate Research, an online resource on faculty and their research programs in institutions throughout the U.S. and Canada. [www.acs.org/DGRweb](http://www.acs.org/DGRweb)

**Experiential Programs in Chemistry** — A one-stop source for information on summer research, internship, and co-op opportunities. [www.acs.org/epic](http://www.acs.org/epic)



### Visit the school

Many programs will offer you the opportunity to visit their school (and will pay for it) either during a visitation weekend or set of weekends. If you can't make one of the scheduled dates, ask about individual visits. You should take advantage of this, as it gives you the chance to see the school and meet with faculty and students to determine if you can see yourself in that program for the next five years.

This is not the time to geographically restrict yourself. Graduate school can be an opportunity to live somewhere different for a few years; and even if you don't like a particular area that much, you will only need to be there for a finite time. Ultimately, of course, just as with your decision about where to apply, you need to ensure that there are faculty members at the school with whom you would like to work. By visiting, you will have the chance to meet with these faculty and their students to get the 'real scoop' on what it is like to go to graduate school there.



### Evaluate your career support

When you visit, take a close look at the facilities that the program offers. You want to make sure that you will have access to the equipment you need to conduct your research in a timely fashion. For example, if you are going to be doing a fair amount of synthesis, find out whether you will need to send your samples out for NMR or X-ray diffraction or mass spectrometry analysis, or will be able to have such procedures done on site.

In terms of your long-term career goals, try to evaluate how the program assists students in obtaining jobs once they graduate. See if they offer career assistance such as helping students prepare résumés, and whether companies actively seek students from the program for employment. Does the school have on-site

interviews? Find out where the graduates from the school have gone after graduation, especially the students of the faculty with whom you are interested in working.



### Understand the program requirements

How many and what types of courses will you need to take? Since doctoral programs are research-intensive, it is unlikely that you will take many classes, but requirements vary from school to school. Are there cumulative exams or oral exams that you will need to pass? Many programs require students to teach a minimum number of courses. What is that requirement for the programs in which you are interested?

While requirements vary, you will find that much of the overall workload is generally comparable, with probably the largest variations coming in coursework. Talk with several students at the school when you visit, and see how they feel about their course/workload. Individual impressions of the school can vary, so get a balanced opinion. If you hear the same things from several people, then the information is probably more reliable.



### Carefully evaluate your offer

Most places will make you an offer that includes a teaching and/or a research assistantship. To fairly compare offers between schools, you must determine what your take-home pay will be, as well as what tuition and fees you will need to pay. At many places these costs may be waived; at others, tuition and fees are paid by the students, while the schools pay the students a higher salary. Don't be fooled by hidden costs! What types of health benefits are available to you as a student? What is the local cost of housing?

All this being said, don't let the stipend be your sole guide in choosing between schools. You are not going to graduate school to make money immediately; rather, you are going there to enhance your future career and overall earning potential. Everyone in graduate school 'lives on peanuts' — so ultimately, you need to be working with faculty whose research interests match your own.

Once you have decided, sign your offer on the dotted line and prepare to work hard. The next step is choosing a research advisor, a process that is addressed in this issue's editorial by Marjorie Caserio. Earning an M.S. or Ph.D. is not easy, but it will be one of the most rewarding experiences of your early career. Revel in the challenge! 



**JAMES BATTEAS** is an associate professor of chemistry and graduate recruitment coordinator at Texas A&M University in College Station, TX.



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# Rxn's and Soln's

Reactions and Solutions is a blog offering tips on selecting and succeeding in graduate school, written by current graduate students.

COMPILED BY LORI BETSOCK

## → BLOG



### Using What You Learned in Kindergarten

The one thing that is essential to searching for graduate schools, joining a graduate research group, and maintaining sanity in graduate school is also one of the first things that you developed in kindergarten. Its complexity increases exponentially as you age:

developing and maintaining personal relationships.

When I was starting the process of searching for graduate schools, I asked a lot of people how to pick "the one." There were more schools of thought on this matter than picking March Madness brackets. Some preferred warm climates. Others picked from the top tiers. Distance was also a consideration. No matter which philosophy you choose, the final decision comes when you get your acceptance letters accompanied with offers to visit their institutions.

I eventually chose a school where I felt the most comfortable with the people, not the climate or the current ranking in *U.S. News*. The incoming and current graduate students I met seemed to mesh with my personality. These were the people I that would be taking classes with – and joining research groups with, developing friendships with, and networking future contacts with. There were several professors that I either felt instant connections to, or at least that I could eventually develop good relationships with. Graduate school will be 4-6 years of your life and you should make sure to place yourself among people who bring out the best in you.

One of my favorite lines from "The Simpsons" is when Homer and Marge take the kids to an independent film. In response to how he liked the film, Bart holds a freshly cut pony-tail to the back of his head and says, "I was so bored I cut the pony-tail off of a grad student. Look at me! I'm a grad student. I'm 30 years old and made \$600 last year," to which Marge quickly snaps, "Bart, don't make fun of grad students. They've just made a terrible life choice!" It may sometimes feel that way when I get overwhelmed with my work, but luckily I have good people around me who experience the same thing and help me get through it.

Posted by Matt



### Bypassing the Cheerleading Squad

One thing I didn't know before I began grad school was how hard it was going to be. Every day is a learning experience though. All the easy stuff had already been done and we have a tough job of figuring out the hard things. Research doesn't work about 99% of

the time, but if we are persistent and focused, we will definitely taste success. Remember only 2% of the people in the world have a Ph.D. and the distinction doesn't come easy.

One thing I recommend is that prospective grad students try and have a life outside the lab. Sometimes it feels like some advisors want you to be in the lab 24/7, 365 days a year. You might get lonely doing research and so you should definitely have a very good friend to support you in grad school.

I chose my present lab because I liked the research and the group dynamics. Getting along with your advisor and other grad students in lab is very important. Otherwise, grad school can be miserable. So, do your research before you pick your lab. Look beyond the students the department hand-picks to give a tour and lunch to prospective students. They are usually the 'cheerleaders' for the department. Talk to other grad students in the lab and if possible, to students in other labs to get feedback about advisors in general. Do not be afraid to ask specific questions about 1) how the advisors treat their students, 2) how helpful the other students in the lab are, 3) how well the professors in the department get along with each other, 4) average time to graduate, and 5) how supportive the school in general is towards graduate students.

Posted by Naresh



### The Job is What You Make It

I was a chemistry first year grad student twice. How much easier my second time around was! Unlike most grad students, I know the difference that *knowing* makes.

The first year is the hardest, and reminding yourself of that helps you keep smiling when thinking about the short term. Striking a happy medium between academics and socializing is important, but that equilibrium should be shifted

## → BLOG continued

considerably to the academics side (be ready to become a library rat if necessary). Impress your professors, especially your future advisor. The hard work you do in your first year is an invaluable investment in making the next 3 or 4 years enjoyable. Don't think of grad school as school, think of it as a job, and be professional right from day one. Make a few decent friends outside your graduate program (don't be trapped in chemistry conversations 24/7!). Don't get into research you are not excited about. Always have a plan, generate ideas, and take ownership! However, nothing is as important as carefully choosing an advisor. Both of my experiences have been superb and I have a senior grad student to thank for that advice!

Posted by Santiago



### That's Why They Call It Research...

I think that's the most important piece of advice I could pass on about grad school—it's called *research*. That doesn't just mean that you'll end up repeating experiments multiple times, or have to read papers at least twice to really understand what they mean. It's a statement about attitude, the most important thing you control in your graduate career.

Graduate school, and research in general, is a frustrating beast. No matter how hard you try or how carefully you plan, something unexpected can always come along and foil your best efforts. But you have to just pick up the pieces and try again. At the end of the day, grad school is what you chose to do; it's where your passion and curiosity have driven you, and you're lucky to be able to use both of those in your 9-5 day (or 6, or more usually 8).

Keep a positive attitude. Don't let failures, setbacks, or complications bring you down. You'll be a lot happier with work. And it is work. You're not in school anymore, even if you're taking classes — you're working for a living now. Maintaining a positive attitude is work too; sometimes you just don't want to or think you can.

Believe me, I've been through some of the toughest stuff to deal with in my graduate career, and Hurricane Katrina flooding the building wasn't the worst of it. If a PhD is what you want, you always have to shake it off, pick up the pieces, and move on. Maintaining a positive attitude will help you keep things in perspective: what you're doing is earning a PhD, something not everyone can do. Even when it goes wrong, you walk away and try again tomorrow. If you do it with a smile, you'll be better off, and the people supporting you will be more willing to help. Your stress will be more manageable. Your life is easier in general when you maintain your perspective. Attitude has everything to do with how we perceive our situation. Don't let grad school

and the ups and downs of research get to you. Just remember — that's why they call it *research*.

Posted by Electa



### What We Have Here is a Failure to Communicate

In graduate school, there are plenty of smart people, interesting research, and brilliant ideas. There are also plenty of examples of how smart people, interesting research, and brilliant ideas were brought low by poor communication skills. While substance is always more important, do not underestimate the power of a well-styled presentation. Whether oral or written, a presentation of your work should always strive to educate and entice. Educate readers on your topic and entice them to read on or continue listening, and find out more.

Unfortunately, the average graduate program throws students into the deep end of scientific communication without the skills to navigate the choppy waters. This is when you've got to find your own life jacket. Investigate taking a specialty science or general writing course, a PowerPoint seminar, public speaking and grant writing workshops, among others. Most academic institutions have a dizzying array of options to improve your communication skills including writing centers with one-on-one assistance. If this sounds like too much time away from the lab, remember that an inability to communicate your research may put you in the "perish" category of the academic "publish or perish" dichotomy.

Posted by Raychelle

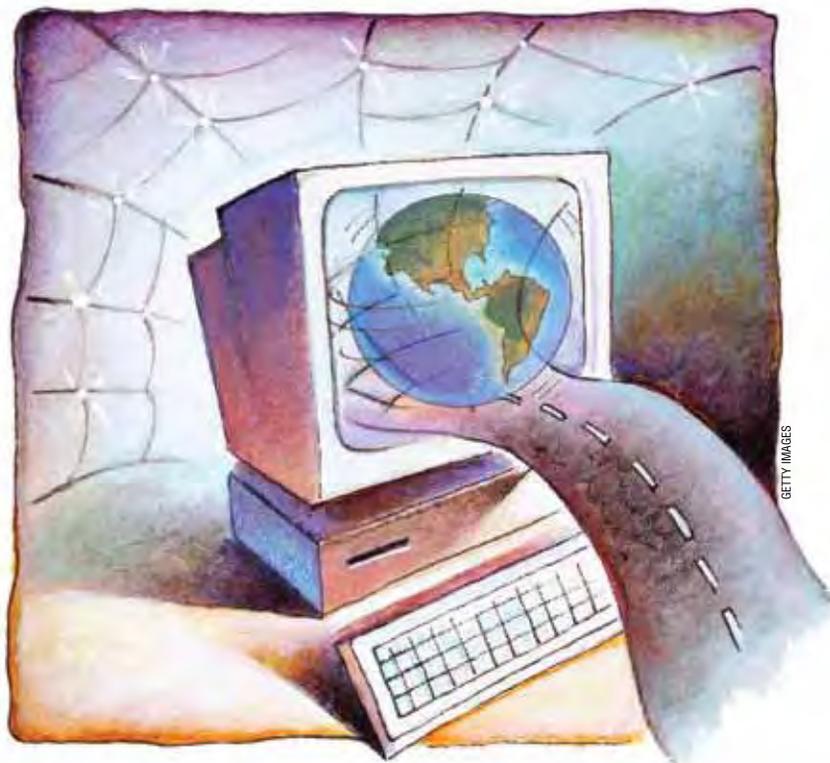
**MATT GRANDBOIS** is a fifth-year graduate student at the University of Minnesota. His research is focused on the production and detection of singlet oxygen within hydrophobic micelles in aquatic systems.

**NARESH SUNKARA** is a fifth-year graduate student at University of Maryland Baltimore County, working on synthesizing modified nucleosides as potential anticancer and antiviral drugs.

**SANTIAGO SANDI-URENA** is a Ph.D. graduate from the Department of Chemistry, Clemson University. Currently, he holds a postdoctoral position at Clemson where his research concerns metacognition and metacognitive instruction.

**ELECTA PARK** is a sixth-year graduate student who will be graduating from Louisiana State University Health Sciences Center in New Orleans, LA in October 2008.

**RAYCHELLE BURKS** is a graduate student at the University of Nebraska-Lincoln, defending her dissertation in fall 2008. She is an analytical chemist focused on the detection of explosives.



# Graduate School Abroad

## Sweeping Reforms Present New Opportunities for Students

BY MEGAN BRENN-WHITE

**S**CIENCE IS AN INTERNATIONAL ENDEAVOR for most students, yet until recently, the map of potential graduate schools has ended at the borders of the United States. However, as the desire to study abroad increases across all fields and language becomes less and less of a barrier, some enterprising students are finding their way to new opportunities completing their entire degree abroad. And they're reaping the benefits.

This first part of this article will give you an introduction to the graduate school landscape in Europe. In the second part, I'll share some details about doing graduate study in Germany in particular, based on my experiences there.

At the recent American Chemical Society national meeting in New Orleans, 83 percent of 120 undergraduate students I surveyed said they would consider going to graduate school abroad. The top four destinations they chose were Germany, the United Kingdom, France, and Italy. Students said that the main attractions of completing a degree abroad were to broaden their horizons and improve career prospects. Yet while the interest was there, few students had any information about graduate schools in Europe.

### New degrees, new opportunities

Part of the reason you may never have heard of graduate programs in Europe is that they used to be difficult for international students to attend, due the degree structures and language barriers. Now, a sweeping wave of higher education reforms called the Bologna Process is standardizing degrees across Europe by 2010 and making mobility between countries much easier. The Bologna Process will essentially create a system based on undergraduate and graduate cycles and will establish a system of credits. The planned reforms will make it easy to transfer from one country within the European Higher Education Area to another for further study or employment. They were also designed to attract people from non-European countries to come to study and/or work in Europe.

Universities across Europe are creating programs to appeal to a global market. While the United Kingdom has long been an attractive destination for students from the United States, English-language programs are opening up the rest of the continent to people who might not yet have mastery of a foreign language. Germany, The Netherlands, Sweden, and Switzerland have been particularly active in creating these opportunities.

So what's the catch? Graduate school abroad is not for everyone and it requires an independent spirit and a willingness to be fully immersed in a different culture for a longer period of time than a typical semester or summer abroad. While English is the primary language spoken in many research groups, for students staying a number of years in countries other than the U.S. and U.K., learning the local language is necessary to truly take advantage of life outside the lab.

On the other hand, this longer commitment means that students will graduate with an understanding of what it means to work in an international environment, as well as some mastery of a foreign language. Karl-Michael Weitzel, dean of the department of chemistry at the Philipps-Universität Marburg – the oldest chemistry department in the world, celebrating its 400<sup>th</sup> anniversary in 2009 – believes strongly that the interest in individuals educated in more than one country is growing and says, “Those people educated in ‘monoculture’ will exist, but those who have a more diverse background will have the advantage.”

## Graduate school, German-style

Now that you have a sense of the evolving world of graduate school in Europe in general, let's talk about a specific example. Germany is the third-most popular destination for international students worldwide after the United States and Britain<sup>1</sup>. Over 10 percent of all students in Germany are international<sup>2</sup> and that number has been steadily growing.

There are several reasons for this trend. The renowned research laboratories in Germany today – at the universities, at companies, and at research institutes such as Max Planck, Helmholtz, Leibniz, and Fraunhofer – are involved in cutting-edge research. There is also the attraction of the strong euro and a massive chemical industry that, according to the German Chemical Society, is the largest in Europe, and trails only the United States and Japan in size.

## How the system works

The road to a Ph.D. in Germany works in much the same way as in the United States: with two years of structured research and coursework comprising a master's degree, followed by a research phase of around three years. The primary difference in Germany is that students generally need to have earned a master's degree to apply for the Ph.D. program. There are a few places where one can complete his or her master's with coursework and lectures

**Interest in individuals educated in more than one country is growing ...**

in English (see page 16) and also, increasingly, Ph.D. programs to which students can apply directly after the bachelor's degree.

There is generally little or no tuition in Germany for master's programs and there are scholarships available from German Academic Exchange Service (DAAD), the Fulbright Commission, and other programs. The Ph.D. itself is funded much as it is in the United States – through research or teaching assistantships – although there are additional sources of scholarship funds from DAAD, the German Research Foundation (DFG), and from many of the programs themselves.

## How to apply

Although there are new “structured” Ph.D. programs which combine coursework with research, the Ph.D. in Germany has traditionally been a research-only endeavor. There are no GREs or standardized entrance exams and students apply directly to an individual professor.

Ph.D.s can be completed at a university or at a research institute.

It might seem daunting to contact a professor directly, but most will respond positively to an e-mail in English or German. Cynthia Heiner, a graduate of University of New Hampshire who is currently completing her Ph.D. at the Fritz Haber Institute in Berlin, asked professors at her university for contacts, got in touch with three professors in Germany via e-mail, and was eventually offered research positions by all three.

## Life as a grad student in Germany

Most Ph.D. students in Germany earn around \$1,300 per month, but Germany's extensive student discounts for cultural



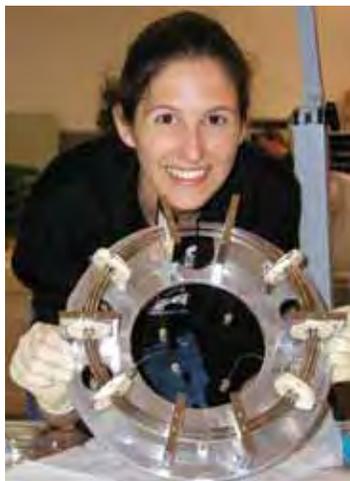
Students in the bilingual chemistry master's program in Berlin.

<sup>1</sup> <http://www.universityworldnews.com/article.php?story=2007101812234565>

<sup>2</sup> <http://www.wissenschaft-weltoffen.de/daten/1/1/3>

activities, regional transit passes included in the nominal student fees, and the low cost of housing mean that the quality of life is often better than it might be with a similar salary in the U.S. Heiner says that she has appreciated both the low cost of living in Berlin ... and the four weeks of paid vacation she gets a year.

The better work-life balance in Germany is a recurring theme when U.S. students talk about life as a grad student there. Lena Hyatt, a University of North Carolina-Chapel Hill senior who completed the RISE program in 2008 observes, "In the U.S., Ph.D. students are working all the time, but in Germany students get the work done and still have time for a life outside the lab." Theresa Kueckmann, who earned her B.A. at the University of Minnesota,



Cynthia Heiner is currently completing her Ph.D. in Berlin.

agrees, saying that she worked only a handful of weekends and very rarely at night while a Ph.D. student at the University of Frankfurt.

## Interested? Then get started!

If you're intrigued by the possibility of doing graduate work in Germany, I encourage you to learn more about the many options you have. By doing a little *Hausaufgaben* (homework, that is), you can find the experience that's right for you. Then, by investing some time and energy, you can gain new friends and a rewarding academic experience that will benefit you and your career for years to come. **IC**

## Select English-Language Master's and Ph.D. Programs in Germany

**M**ost German universities offer information about their graduate programs online in English. Below is a list of useful websites. Also, speaking to professors in the U.S., many of whom have research collaborations with German partners, can help give you contacts for potential Ph.D. advisors.

**Database of All Courses** <http://www.higher-education-compass.de>

**Database of International Degree Programs** <http://www.daad.de/idp>

**Max Planck Institutes** <http://www.mpg.de/english/portal/index.html>

**Freie Universität Berlin Master and Ph.D. in Chemistry** <http://www.master-phd.de>

**International Max Planck Research School for Advanced Materials Ph.D.**

(Master's required to apply) <http://www.imprs-am.mpg.de>

**Johann Wolfgang Goethe-Universitaet Frankfurt Ph.D. programs** <http://fias.uni-frankfurt.de/>

**International Graduate Studies in the Munich area** <http://www.ams.cup.uni-muenchen.de>

**Ruhr University Bochum 3 Year Research Ph.D. with 1 Year Preparatory Training** <http://www.rub.de/gscb>

**Technische Universität Braunschweig Master's and Ph.D.** <http://www.tu-braunschweig.de/chemistry>

**Technische Universität Darmstadt Fast Track Ph.D. in Chemistry** <http://www.tu-darmstadt.de/fb/ch/Welcome.en.tud>

**University of Bielefeld International Graduate School of Chemistry and Biochemistry Ph.D.**

(Master's required to apply) <http://www.uni-bielefeld.de/chemie/studlehr/gradschool>

**University of Siegen International Graduate Studies in Chemistry Master's**

<http://www2.uni-siegen.de/~fb08/english/studium/mastercourse.html>

## Test the Waters for Study Abroad: RISE, IREU, and IREP

**U**S. AND CANADIAN undergraduate students can get a very good sense of what life as a graduate student is like through the RISE, IREU, and IREP programs.

More than 900 undergraduates applied last year for RISE (Research Internships in Science and Engineering). This summer program, offered by the DAAD, provides scholarship funding for students to work with doctoral students in Germany on a wide variety of research projects. Ulrich Grothus, director of DAAD's office in New York City, said that the number of science and engineering students applying for scholarships for graduate programs in Germany has also increased over the past few years, and recently a number of successful applicants were former RISE participants. The program offers a stipend to cover living costs, and no German language ability is necessary to apply.

Many of the RISE students use the opportunity to test out a potential career in research. Andrew Chen, a senior at Pitzer College, is now convinced that he would like to get his Ph.D. and pursue a career in research. He completed the RISE program in 2007 at Frankfurt University and is planning on going back to work for a year as part of the same research group to gain additional experience before applying to Ph.D. programs in the U.S. or Germany.



Megan Renee Johnson worked with Boris Schmidt at the Technical University of Darmstadt.

Lena Hyatt had spent a semester in Costa Rica and had no specific interest in Germany initially, saying, "If any country in Europe had offered RISE, I would've applied!" Because of Germany's international reputation in chemistry, Hyatt's personal experience at Giessen with its proximity to other labs in Europe and, of course, the friends she made, Hyatt is now looking for graduate programs in Germany.

The ACS International Research Experience for Undergraduates (IREU) exchange program gives undergraduate students an opportu-

nity to pursue scientific research at universities in France, Italy, Germany, the United Kingdom, and the United States that are recognized as top producers of scientific knowledge. Students spend 10 weeks working with graduate students and research directors to develop scientific skills and experience living and working in a foreign country. Participants receive a stipend to cover living and travel expenses. For more information, go to [www.acs.org/international](http://www.acs.org/international) and click on Student Exchange Program.

The International Research Experience Program (IREP) at the Technische Universität Darmstadt (TUD) is similar to RISE but extends the research period to an entire semester. Megan Renee Johnson was the first student to take part in IREP, which she used to count toward her capstone experience at Marshall University. After completing IREP, Johnson applied to stay on at TUD and take part in its fast-track Ph.D. program. This Huntington, West Virginia native believes that, "you have to be very international because that's the way science works best." **ic**

CLAUS VÖLKER



**MEGAN BRENN-WHITE** is executive director of the Hessen Universities Consortium office in New York, which helps the 12 state-funded universities in the German state of Hessen reach out to North American students and institutions (<http://www.hessen-universities.org>).

Adapted with permission from *Chemical & Engineering News*, April 14, 2008, Volume 86, Number 15, pp. 55-59. Copyright 2008 American Chemical Society.

**F**OR CASEY MCLEOD, THE reality of working in an industrial lab has exceeded her expectations. The synthetic organic chemist who joined Dow AgroSciences in

Indianapolis in October 2007 says she is surprisingly encouraged to make significant and satisfying contributions to the company's R&D efforts despite not having an advanced degree.

"In the past, and still in some companies today, I think there's a mentality that Ph.D. chemists are the only employees who are qualified to form hypotheses and come up with research ideas, leaving B.S.- and M.S.-degreed chemists to simply test and exemplify them," says McLeod, who earned a bachelor's degree in chemistry from Purdue University in 2006. "But at this company, at least, that's the farthest thing from the truth."

thinking outside the box, gaining experience through internships and temporary work, and polishing interviewing skills, according to the chemists *C&EN* interviewed.

"I am surprised to find that I am free to generate hypotheses and do the work needed to test them," McLeod says of her job designing and synthesizing novel molecules to control pests. "It's just a very level playing field. And that is really motivating to me. The supportive culture here encourages me to do the best science that I possibly can."

Elise Birkett, who earned an M.A. from Boston University in May 2007, is enthusiastic about her new job as an associate scientist and organic synthetic chemist at AstraZeneca in Boston. Working in the area of antibacterial drug discovery, her job "certainly does not involve doing the same reactions over and over again. I am

for products including dental composites, contact lenses, and cosmetics. "We are a small, tight-knit group where everyone knows each other, and if there's a big job to do, everyone jumps in and helps out," says Jim Duff, an Esstech research chemist who earned a B.S. in chemistry from California State University, Fullerton, in May 2007.

For his part, Duff is actively involved in work to tailor molecules to fill specific gaps in the marketplace or to fit the precise needs of customers.

Another plus, he says, is that his position also allows him room to do "true 'blue-sky' research" in between customer projects.



Esstech's Jim Duff

AMY STRONG

# Launching Corporate Careers

Recent B.S. and M.S. graduates ignite their passion for chemistry within diverse businesses

By SUSAN J. AINSWORTH

And McLeod — one of a dozen of fledgling non-Ph.D. chemists contacted by *C&EN* — is not alone in her perceptions. The experiences of these chemists give a glimpse of the kinds of engaging jobs that some B.S. and M.S. chemists are finding in industry now.

The key to tapping into these opportunities is



Casey McLeod of Dow AgroSciences

DOW AGROSCIENCES

very much encouraged to do new chemistry," she says. "I always feel that my ideas are very valued, and so I feel the freedom to try different things and come up with my own ideas, which is really what makes chemistry exciting."

As a consequence of the competitive industrial environment, many companies need to have all their employees — regardless of their level of education — contributing ideas and creating solutions. Empowering employees at all educational levels is critical at Esstech, an Essington, Pa.-based developer and manufacturer of specialized raw materials

Similarly, freedom to work independently and to learn a new area of chemistry is something that Brian Caldwell loves about his new job as a radiochemist for IBA Molecular, an international diagnostics company. He came to IBA's Sterling, Va., facility after a brief stint with a Maryland-based bioscience company where he was limited to doing very basic, directed chemistry, he says.

Caldwell feels fortunate to have landed this kind of role in R&D with only a bachelor's degree, he says, noting that he might have "come in at the right time" as his department had just been formed. Still, at IBA, his advanced-degreed colleagues "treat me as an equal," says Caldwell, who earned a B.S. in chemistry from the University of North Carolina, Wilmington, in May 2006.

While some B.S.- and M.S.-degreed scientists are pleasantly surprised by their level of involvement in company R&D efforts, others are delighted to discover the breadth of opportunities that are available to them.

"I always thought that my only option would be to work in a lab or as a technician, but I was amazed by all the different jobs that were offered to me," says Monica Huynh, who is now a semiconductor fabrication engineer at Texas Instruments in Houston. In this position, which she took just after graduating in

May 2008 with a B.S. in chemistry from the University of Texas, Austin, she monitors the stages of manufacturing “to optimize efficiency and make sure the process runs smoothly on a daily basis,” she says.

Venturing into the engineering job fair at UT Austin, she was surprised to find that the visiting companies were actively recruiting chemists. Chemists, they reasoned, are trained to be detail-oriented and have strong problem-solving skills, which are beneficial within corporate team structures. In addition, she found that “there are phases in the process of making a semiconductor chip that a chemist might understand better than a mechanical engineer.”

Thinking outside the lab may create multiple opportunities for some chemists like Huynh. For others, exploring nontraditional job possibilities may serve as a strategy for finding a first job in a market where demand for chemists has been fluctuating.



Monica Huynh, with Texas Instruments

“I sometimes felt that my only career path led to a seat behind a laboratory bench,” says Rachel Wooley, now an associate editor with Holt McDougal, a division of textbook publisher Houghton Mifflin Harcourt. “But as my own job search began, I realized that many fields require the expertise of a scientist,” she says.

Wooley began her job in August 2006, about three months after graduating magna cum laude with a B.A. in chemistry and a minor in professional writing from Texas A&M University. Currently, she is involved in editing the chemistry chapters of a middle school physical science book.

Job seekers need to be open-minded and creative in their search, Wooley says. Although she was most interested in scientific writing, she applied for employment in a variety of fields, including forensic science, public relations, and teaching, she says.

Chemists can often gain an edge in the job market by having lab experience. For example, Eric Hendrickson, a product technologist at GE Water & Process Technologies in The Woodlands, Texas, took on an internship at the Tarrant County Medical Examiner’s office in Fort Worth, working with their analytical teams in trace, drug, and toxicology labs. Having hands-on experience with instrumentation gave him an edge over other applicants for his current position, which involves performing analytical tests for customers in the water and hydrocarbon process industries, says Hendrickson, who earned a B.S. in chemistry at Texas A&M in 2005.

For some, internships or other temporary jobs can lead to lucrative full-time positions within the same organizations. McLeod, for example, landed an internship with Dow AgroSciences over the summer of 2004, and then secured a temporary job there as a contract chemist. She held that job throughout most of her senior year and for nine months afterward, before being hired into her current position.

The temporary work allowed McLeod to sharpen her technical skills and test the waters at Dow, while the company evaluated her in an “extended interview process,” she says. “In the end, I was a very low-risk hire.”

Another B.S.-level chemist, LeAnthony Holliness, used temporary work as a stepping stone to a full-time position within the same company. While earning a B.S. degree in chemistry from Texas A&M, Holliness began searching for internships in beauty and health care product development — a field he had dreamed of entering after studying synthetic organic chemistry.

He became interested in Procter & Gamble after participating in a company symposium recommended by one of his professors. He was accepted into an internship there the following summer. And in June 2007 he started in his job as a product development researcher, testing products and ideas with consumers to “understand what they really want and how we can bring that to life through our technology.” Holliness believes that the internship gave him exposure critical to landing the full-time position because it “really showed them

how I would fit,” he says.

Those who can’t intern for a prospective employer can often demonstrate their ability to assimilate into the corporate culture through the interview process. “Although your CV and letters of recommendation from your adviser are the keys that get you in the door, it’s your performance in the interview that gets you the job,” says Donna Friel, an assistant scientist within the lead discovery team at Schering-Plough Research Institute in Cambridge, MA. At that point, “it’s not so much about the chemistry, it’s about you as a person and how you would fit with people that you work with,” says Friel, who is finishing a master’s in chemistry at Boston College.



Donna Friel of Schering-Plough Research Institute

Gaining an edge in the interview “has a lot to do with attitude and passion,” Holliness says. While meeting with Procter & Gamble recruiters, “I asked a lot of questions, and it was probably clear that I wanted nothing more than to get in there and play with them.”

Not surprisingly, Holliness aspires to carve out a long career in beauty and health care product development. “One day I hope to be the lead for many great projects that make superior products to positively impact the lives of people around the world.”

Others, such as Dow AgroSciences’s McLeod, say they may eventually return to school to pursue a Ph.D. However, for now, she says, “I can do everything I want to do — from mental and paper chemistry to physically executing the reactions,” she says. “I am very happy.” **IC**



Based in Dallas, Texas, **SUSAN J. AINSWORTH** is a senior editor at **Chemical & Engineering News**, covering employment trends. She has been writing for chemistry-related publications since graduating with a

bachelor’s degree in chemistry from The College of Wooster (COW) in 1984. She became interested in science journalism after reading a pamphlet on nontraditional careers in chemistry in the library in the COW chemistry building.



# Getting the 4-1-1 on Graduate School Faculty and Institutions

By MARTA GMURCZYK

**I**MAGINE THAT YOUR UNDER-graduate research focused on molecular spectroscopy, and you wanted to continue your study in this area while in graduate school. Or maybe you're interested in molecular genetics, and are trying to locate the departments that specialize in this area. Where can you quickly and easily find out which schools offer such graduate-level opportunities? The answers are right at your fingertips ... on the ACS website!

Just go to [www.acs.org/dgrweb](http://www.acs.org/dgrweb) and search **DGRweb 2007**. This free resource allows you to search for information both faculty and graduate institutions. In the Faculty Search section of the **DGRweb**, you type "molecular spectroscopy" into the "specific research" box, and within seconds, you get a listing of 34 names of faculty dealing with

molecular spectroscopy in their research. For each of these faculty members, you can further retrieve information on their specific research area, academic rank, and gender, along with titles of all papers published within the last two years, and contact information including direct links to their e-mail address and website.

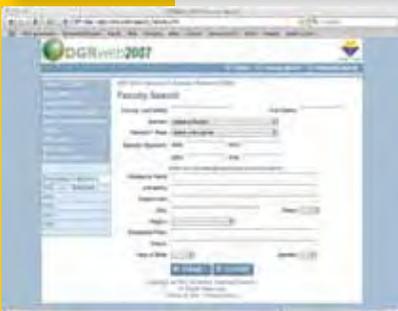
To locate departments that specialize in molecular genetics, go to the Institution Search section of **DGRweb** and type "molecular genetics" into "fields

of specialization." Within seconds, you will receive a list of 10 institutions along with links to all departmental contact information, statistical data on the number of faculty and graduate students, and a complete list of faculty active in graduate research.

And that's not all. If you're interested in seeing whether there have been any changes in a graduate program in a selected department within the last five years, **DGRweb** can provide that information also. The site includes access to the complete 1999, 2001, 2003 and 2005 DGR databases!

**DGRweb** and the printed 2007 edition of the ACS *Directory of Graduate Research* are the most comprehensive sources of information on faculty and their research at programs in chemistry, chemical engineering, biochemistry, and related chemical sciences in the U.S. and Canada. Both contain listings for over 660 academic programs, 10,000 faculty members, and 90,000 publication citations.

Try searching **DGRweb** today. Let ACS know what you think by completing the 60-second survey. This survey provides ACS staff with data to help improve the future editions of the **DGRweb**. And ... while you are surfing the **DGRweb**, do not forget to bookmark it. More than likely, you will be coming back for more information! 



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The online, searchable version of the DGR (DGRweb) is a free resource available on the ACS website at [www.acs.org/dgrweb](http://www.acs.org/dgrweb).



Marta Gmurczyk is the manager of the Office of High School Chemistry and formerly an education associate in the Office of Professional Training at the American Chemical Society.



RICHARD NOWITZ/NEW ORLEANS CONVENTION &amp; VISITORS BUREAU

# Exploring Chemistry in the Big Easy

## Undergraduate Programming in New Orleans

By CHRIS POLLOCK

It's the event we all look forward to: the American Chemical Society (ACS) national meeting held each spring! This year's meeting was in wonderful city of New Orleans, LA. It was a great opportunity to attend an ACS national meeting, support New Orleans as it continues its efforts to rebuild and revitalize after Hurricane Katrina, and experience the unique spirit and culture of the city.

As always, this year's meeting provided Student Affiliates opportunities to engage in professional development — and to have a little fun. The first two days of the conference were dedicated to undergraduate events. The program offered everything from graduate school recruiting fairs, to demos using household chemicals, to talks on topics ranging from drug discovery to chemistry in sports.

### Sunday, April 6 In the beginning

To kick off the undergraduate events, ACS hosted a hospitality center where students could grab breakfast, talk with friends, and network with faculty and students from more than 300 universities and colleges. There were

also some great ACS freebies, and literature on careers in chemistry and other opportunities. This was an excellent place to network and plan out one's activities over the next two days.

### Graduate school?

The first event of the day was the Graduate School Reality Check. Here, students learned all about what's ahead in our academic careers and what graduate schools are looking for when selecting candidates for their programs. James Batteas, a recruiter and professor from Texas A&M, led the session (see his article on page 9). A presentation and a panel discussion with recruiters, fellow industry representatives, and current graduate students provided very candid answers to questions from students concerning research experiences, GRE scores, master's versus Ph.D. degrees, and more. Directly following was the Morning Tea with Graduate School Recruiters.

Primed with all of the information from the Reality

Check, hundreds of students used the opportunity to peruse displays from dozens of graduate schools and network with admissions representatives, graduate school professors, and students.

### Let us demonstrate

Always a popular event, the Chemistry Demo Exchange was a great place to meet and network with Student Affiliates from nearly 40 chapters and to pick up tips and new ideas



ACS

for science and outreach activities. Everyone showed off their favorite demos using household chemicals, and there were presentations on everything

from slime to bouncy balls. This was a great opportunity to learn some

easy and educational demos for outreach activities, and to network with fellow SAACS chapters.

### Technically speaking

The technical portion of the undergraduate program began with "Polymers in Sports and Health," where we discovered just how pervasive polymers are in our everyday lives and how they make modern life possible in many surprising ways. In the "Community Outreach Workshop," we learned about fun and creative ways for chemists and SAACS chapters to celebrate Earth Day and National Chemistry Week. The "Chemistry Survival Guide" presentation was extremely helpful, providing a range of tips from the basics of studying to writing out multi-step syntheses. The "Careers for Chemists in Public Health" forum featured an interesting and insightful panel discussion on how and where chemists are needed in the often-overlooked field of public health. Many of us aren't sure what to do with a chemistry degree after graduating, and hearing about real-life career experiences helps us to narrow down our career choices.



ROANOKE COLLEGE

### Party time!

The SAACS Awards Ceremony was a phenomenal event that honored the hard work and dedication of SAACS chapters during the 2006-07 academic year. Nearly 200 chapters received Outstanding, Commendable, or Honorable Mention awards for their activities. A select few also received Green Chemistry Chapter awards for their activities promoting environmentally friendly chemistry.



ACS

The night ended with the Undergraduate Social, hosted by Dillard, Loyola, and Xavier Universities. There was plenty of food, a DJ, and live jazz music. It provided the perfect atmosphere to socialize and network with students from other chapters and wind down after a long day at the conference.

### Monday, April 7 Breakfast!

There was no rest for the weary, as Monday morning's events started with a second round of graduate school recruiting. Students were able to munch on breakfast – including famous New Orleans beignets! – and talk with recruiters before heading off to the day's programming.



ACS

### Technically speaking, round II

After breakfast, it was time to get technical with another round of symposia. "Chemistry in Medicine" offered cutting-edge topics on drug delivery and anti-oncogenic drug research, providing us with insights into the rich interface between chemistry and medicinal science. "Kids and Chemistry" focused on teaching elementary school-children about polymers. This event was especially useful to SAACS chapters looking to offer community outreach events targeted at young children. It gave us insights into the best methods for teaching demonstrations, with particular emphasis on keeping everyone safe.

### A plethora of posters!

This year's Undergraduate Research Poster sessions were a huge success. More than 1,200 posters were presented and for most students, this was their first experience in presenting research at a national meeting. Countless visitors browsed the posters during the two sessions. These sessions provided great opportunities to see the exciting research being done by undergraduates and to network and share ideas with those researching similar areas.

### Ingenuity or serendipity?

Richard Silverman, from Northwestern University, was the Eminent Scientist lecturer for this meeting. Silverman is probably best known for developing Lyrica, a drug used to combat epilepsy and neuropathic pain. He gave a fantastic talk on the rational drug design process used to develop such drugs as Lyrica and Viagra. Not



RICHARD NOWITZ/NEW ORLEANS CONVENTION & VISITORS BUREAU

only was the topic interesting, but Silverman also managed to present his talk on a level perfect for undergraduates, including the occasional accent of humor!

### In closing

The undergraduate programming in New Orleans came to a close with a SciMix poster session. Successful SAACS chapters presented posters sharing their experiences over the past year, advertising successful events, and even asking for help overcoming difficult problems. Student Affiliates were able to network with one another and swap ideas for how to improve their SAACS chapters in a relaxed, informal atmosphere.



FLORIDA INTERNATIONAL UNIVERSITY-BISCAYNE BAY CAMPUS

### Meeting the corporate world

The Corporation Associates Reception was the perfect event for anyone interested in meeting and networking with scientists in industry. Set up as a series of stations, liaisons from many of the major chemical companies and representatives from government labs and agencies gave short presentations about internships, how to begin careers in their industries, what to expect, and how best to prepare. The representatives were very approachable and friendly. They also enthusiastically answered any questions from students.



**CHRIS POLLOCK** is a senior majoring in chemistry at Clemson University and is the 2008 Student Liaison to the ACS Task Force on Undergraduate Programming.

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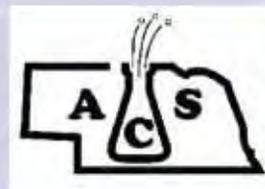


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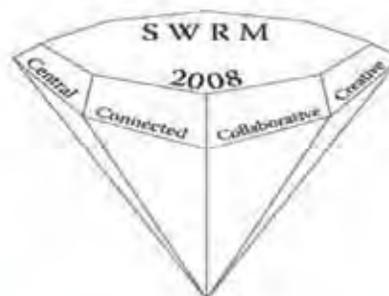
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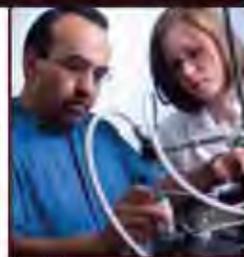


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