

The Magazine for ACS Student Affiliates
November/December 2008

in *Chemistry*

Careers in Chemistry



**No Better Teacher
than Experience**



Interesting Articles

Guarding Fair Trade

Linda Wang reports on a career in customs and border protection which combines analytical chemistry with law enforcement. *Chemical & Engineering News*, August 11, 2008, Volume 86, Number 32 pp. 45-46. <http://pubs.acs.org/cen/employment/86/8632employment.html>

Ich bin Postdoctorin in Berlin

Vasana Maneeratana writes about pursuing a postdoc abroad. *Science Careers*, October 03, 2008 http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2008_10_03/caredit.a0800146

Interesting Web Sites

American Academy of Forensic Sciences: Choosing a Career

This guide explores the many career options in forensic science. http://www.aafs.org/?section_id=resources&page_id=choosing_a_career

P&G Company: Science Behind the Brands

Learn about the science behind personal care products. <http://pg.com/science/index.shtml>

Graduate School Web Links

Research M.S. and Ph.D. Programs

Boston College: www.bc.edu/chemistry

Florida Atlantic University: www.science.fau.edu/chemistry

George Washington University: www.gwu.edu/~gwchem

Marshall University Forensic Science: <http://forensics.marshall.edu>

Rice University: www.chem.rice.edu

SUNY Environmental Science and Forestry: www.esf.edu/chemistry

Temple University: www.chem.temple.edu

Texas A&M University: www.chem.tamu.edu

University of Central Florida: www.cos.ucf.edu/chemistry/

University of Nebraska at Lincoln: www.chem.unl.edu

University of San Francisco: www.usfca.edu/mschemistry

University of South Dakota: www.usd.edu/chemistry

University of Tennessee: www.chem.utk.edu

Professional Master's Degree Programs

Arizona State University: <http://math.asu.edu/~cbs/>

Keck Graduate Institute of Applied Life Sciences:
www.aboldnewhybrid.kgi.edu

Rice University: www.profms.rice.edu

Temple University: www.temple.edu/psm

Towson University Forensic Science: www.grad.towson.edu/frscm/mg

Editor Nancy Bakowski

Associate Editor Lori Betsock
Audley S.V. Burke

Design & Production Cornithia A. Harris

Editorial Assistant Robin Y. Lindsey

Copy Editor Eric R. Stewart

Director, Education Division, ACS
Mary M. Kirchhoff

**Assistant Director for
Higher Education, ACS**
Jodi L. Wesemann

2008–2009 Advisors

Ludivina Avila, South Texas College

Charles Baldwin, Union University

Eric Borguet, Temple University

Simon Bott, University of Houston

Mary Carroll, Union College

Anna Cavinato, Eastern Oregon University

Ping Furlan, University of Pittsburgh at Titusville

Beth Jensen, Aquinas College

Pam Kerrigan, College of Mount Saint Vincent

Meredith Storms, University of North Carolina
at Pembroke

Scott Tremain, Eastern Illinois University

Louise Wrensford, Albany State University

Published by the American
Chemical Society Education Division
at 1155 Sixteenth Street, NW,
Washington, DC 20036.

© Copyright 2008 American
Chemical Society. All rights
reserved. None of the contents of
this publication may be reproduced,
stored in a retrieval system, or
transmitted in any form or by any
means without prior written per-
mission of the publisher.

Canadian GST Reg. No. 127571347



Published for Student Affiliates of the American Chemical Society



EVERGREEN STATE COLLEGE



PHOTO COURTESY OF KATHERINE HOOKS

Cover: JupiterImages.
Inset photo courtesy of
Ryan Biczio.

in Chemistry is available free to Student Affiliates of the American Chemical Society and the faculty advisors to Student Affiliates chapters. For an application, call the Undergraduate Programs Office at 800-227-5558, ext. 4480. The American Chemical Society assumes no responsibility for the statements and opinions advanced by contributors. Registered names and trademarks, etc., used in this publication, even without specific indication thereof, are not to be considered unprotected by law.



PHOTO COURTESY OF CHERILYN PASCO

EDITORIAL

Where do I Start?

Preparing for a Career in Science
as an Undergraduate

2

By Roslyn White

SAACS CHAPTER SPOTLIGHT

3

Compiled by Audley S.V. Burke

CHAPTERS

2007-2008 Student Affiliates Chapter Awards

5

2008-2009 Innovative Activities Grants and
Community Interaction-Student
Affiliates Grants

12

FEATURES

The Chemistry of Forensics

13

By Allison Byrum Proffitt

Cosmetic Chemistry

16

By Kristen D. Collins

Doing Science Abroad

19

By Chapin Rodriguez

RXN'S AND SLN'S

Blogging about Careers

22

Compiled by Lori Betsock

ACS RESOURCES

There's No Better Teacher than Experience

24

By Lori Betsock

MEETINGS

Undergraduate Program:
237th ACS National Meeting

26

Student Affiliates Reaching Out:
40th Mid-Atlantic Regional Meeting

28

By Jennifer Chabra and Weici Fang



COURTESY OF ROSLYN L. WHITE

Where Do I Start?

Preparing for a Career in Science as an Undergraduate

BY ROSLYN L. WHITE

For as long as I can remember, I have been interested in chemistry and the sciences. Having been born and raised on the island of Barbados, my formative education was fashioned according to the British education system. I was exposed to chemistry from the age of 11 and was encouraged strongly to pursue it as a career. Now that the hurdles of formal scientific education are behind me – Combermere School (Barbados, West Indies), Regis College (Weston, MA), University of Florida (Gainesville) – I can now find humor in the fact that I failed my first national chemistry exam, an O-level subject exam administered through the United Kingdom.

When I entered Regis College in the fall of 1986, I knew I wanted to major in science, but could not decide between chemistry and biology. So much did I wrestle with the decision that I attempted to dual-major in both sciences. When school policy dictated a single major, chemistry won by default. My reasoning was, that I would need chemistry to become a biology major.

As an undergraduate science major you have a pretty good idea of which classes and labs are required, and in which order to take them. But all science majors know that – or will eventually.

So what will make you stand out? What will be your “unique selling point” when the industrial recruiter or the academic recruiter screens your résumé among the thousands out there?

Start with undergraduate research! If there are opportunities at your institution, pursue them. If not, pursue summer research at external institutions that sponsor undergraduate summer research.

Undergraduate research serves two purposes: If you are contemplating graduate school, it helps you decide for which

area of research you have passion. If you are contemplating industry, it helps you decide to which type of work you might gravitate.

There is something to be said of the old adage, “it’s not what you know, it’s who you know.” I prefer to say, “it’s who you know that allows you the opportunity to perform what you know.”

Therefore ... network, network, network. You accomplish this through skillful communication. Consider every encounter a potential interview. Have in mind the skills you have to offer. Thus, have your “two-minute script” ready. That simply means being able to convey in two minutes or less: who you are, what your career interests are, and the experiences you can bring to the table. In other words, how can the other person benefit from you being in their network? We all listen to the same radio station – “WIFM” – what’s in it for me? Too often when we network, we think of me, myself, and I. It is more advantageous to concentrate on me, you, and *why*.

Networking sounds straightforward enough ... but how can you learn to do it? Join a professional association that relates to your major. Most professional associations offer student discounts on dues, and benefits include access to annual meetings, gaining exposure to your field, a forum to practice public speaking and presentation skills (on undergraduate or summer research experiences), as well as networking.

Internships are an excellent way to experience industry first-hand. Experience with an internship in your field speaks volumes for your career. It can offer opportunities for potential hiring within a particular company. As teaching degrees require teaching in an actual classroom setting, an internship allows you the experience and exposure for which theory lays the foundation.

Although internships may evolve as a result of networking, they also offer an invaluable platform for starting and/or

growing one’s network. While networking, you are building and promoting your personal brand. Think of yourself as a walking advertisement. In our technological world, marketing oneself is one of the greatest responsibilities with which we are charged. Promoting one’s capabilities – the benefits that one can offer to any organization – need not be a daunting task. When one matches a need with a skill set, it results in a “win-win” situation.

Now let’s review. You are receiving sound preparation as an undergraduate major. Get research experience with undergraduate or summer research. Networking should become second nature. Join a professional association. Gain work experience with an internship. Market your personal brand. Still having trouble getting started? What should you choose?

Consider a few assignments to help you decide. Conduct research outside of your major. For example, major in chemistry but research in biology (or vice-versa). Intern in a “non-traditional” or inter-disciplinary field. For example, choose scientific writing vs. lab work, or seek an internship in a small biotech firm vs. a large chemical manufacturer. If you can’t get on-site research at your institution, apply for summer research. Never miss an opportunity to converse with someone in the field in which you are interested. Think of science as being limitless – challenging, but with limitless opportunities. Though roads to a career have similar stepping-stones, each path is as unique as the individual making the journey.

ROSLYN L. WHITE received her B.A. in chemistry from Regis College in 1990 and her Ph.D. in organic chemistry from the University of Florida in 1995. She is currently a senior research scientist with SC Johnson and chair of the ACS Committee on Corporation Associates.

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.

COMPILED BY AUDLEY S.V. BURKE

The Evergreen State College

Olympia, WA

Chapter president: Mikako Gillespie

Number of chapter members: 30

Number of ACS Student Affiliates: 20

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

Chapter website: <http://chemclub.evergreen.edu>

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

A During orientation week at the beginning of the school year, we held our Volcano BLAST-off, where we blow up our 12-foot baking-soda-and-vinegar volcano. The show always draws a huge crowd, including new recruits. In addition, chapter officers visit all of the science classes (with permission from faculty) to share what the chapter is about and to recruit new members. We also have fun parties during Mole Day or at the end of the quarter and invite broader audiences to attend. Throughout the school year, we participate in the student club events on campus and often do a crowd-pleasing activity such as making liquid nitrogen ice cream or UV-detecting bead bracelets.

Q How do you retain members from year to year?

A We have something for everyone. We give students the opportunity to do community service, host speakers, participate in career-enhancing activities, attend conferences, present research, do science with local schoolchildren, etc. We encourage students to find something that is meaningful for them to do and then do it! No one is excluded.

Q What is/are your most popular activity?

A Our most popular chapter activity is the end-of-the-year Science Carnival. This is a huge science appreciation, education, and outreach event that attracts the entire campus, as well as over 600 schoolchildren and parents from the surrounding community. The carnival runs for two days, with over 200 science presentations and activities presented by science undergraduates.

Q How do you inform chapter members of chapter activities?

A To reach the broader audience and non-science students, we use our website, the student and local newspapers, posters, and flyers. We also co-sponsor events with other student clubs and community organizations, have a presence on the campus radio station, and hold a weekly bake sale.

Q What is your most successful fundraiser to date?

A Our most successful fundraiser has always been our weekly bake sale. Every Tuesday (and on occasional Thursdays), members volunteer to either bake or sell goods. While we're selling, we promote all of our upcoming events, and also make and sell club/science but-



tons. People look forward to our treats every week. As a result, we gross between \$100 - \$200 each week!

Faculty Advisor
Dharshi Bopegedera,
5 years

Q Why/how did you become a faculty advisor?

A I was keen to have a student chemistry club on campus from the first day I was hired! When the opportunity arose, I was only too eager to accept. It is a wonderful way to help young students interact with the greater chemistry community.

Q What is your role as a faculty advisor?

A I give autonomy to my students and let them know it is "their chapter." I make sure that they do not stray too far, although I am not hesitant to allow them to learn from their mistakes. They come to me for advice and help, which I am very happy to give. At times I encourage them to do activities they may not have pursued on their own. I also encourage the students to be more active in the ACS local section activities.

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

A To see students learn to become leaders in their community. It is truly rewarding to see the shy freshman develop into the confident senior, who is eager to serve the needs of others.

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

A Let the students take leadership, and then stand in the background. They will seek your help and advice, but always give them the opportunity to make the decisions.

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

The University of Texas at Tyler Tyler, TX

Chapter president: Adam Lankford
Number of chapter members: 22
Number of ACS Student Affiliates: 22

Institution environment/composition: Small, public, rural, 4-year institution

Q What is your most successful recruiting event/method?

A Our most successful event is known as the "Big Three" meeting. Each semester, we co-host the event with Tri-Beta (the biology club) and Pre-Med/Pre-Dent (the pre-professional club) with the goal of encouraging participation in all three organizations' events.

Q Does your chapter participate in National Chemistry Week?

A Mole Day is our biggest and most extravagant event during the week. This past year we handed out free coffee in the morning and popcorn all afternoon. We also had karaoke, performed a chemistry magic show, and held a bingo tournament in the University Center.

Q How often does your chapter meet?

A We have formal meetings at least once a month and two or more social events each semester, and we always try to involve as many students and faculty as we can. In addition, we host senior seminars with outside speakers, and encourage chapter members to attend.

Q Does your chapter have a Web page?

A We developed a website that allows current and prospective members to check announcements, apply for membership, learn more about our activities, and see photos from each activity.

Q What is your most successful fundraiser to date?

A Our chapter has had enormous success in raising funds by selling laboratory notebooks, goggles,

and ACS Study Guides. In addition, we are completing an organic chemistry reaction handbook/study guide that will be available for purchase next fall.

Faculty Advisor Jason Smee, 2 years

Q Why/how did you become a faculty advisor?

A Each faculty member takes turns rotating through a two-year term: one as advisor and the next as co-advisor. Having participated in outreach activities as an undergraduate myself, I was happy to jump into the rotation shortly after joining the department.

Q What is your role as a faculty advisor?

A Our students are, for the most part, self-reliant when it comes to planning activities and running the organization. I provide support through advice at meetings and by participating in the chapter's fundraisers, chemistry magic shows, and community service projects.

Q What challenges have you faced in your position?

A We are a rapidly growing school with many students also working part-time jobs, and it has been difficult to schedule meetings and activities that most students can attend; as a result, some students feel left out. As much



UNIVERSITY OF TEXAS AT TYLER

as possible, we try to schedule activities in the evenings or the weekends so that everyone has a chance to participate.

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

A It has been extremely gratifying to watch the students grow and mature professionally. They learn about teamwork, are responsible for planning the chapter's activities, and get the chance to practice their presentation skills at community outreach activities.

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

A It was probably when I gave an oral presentation as part of an international conference. I was very nervous, yet excited to speak in front of some of the world's

experts in my area of research. A close second would be watching our undergraduates present their research.

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

A Try to let the students run the show. Mistakes will occur and problems may arise, but it is their group and with your advice, they will learn and grow. You must also be willing to devote a fair amount of time to helping the students out when they need it, especially for those last-minute activities that always seem to pop up. **ic**

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 other Student Affiliates nationwide. Just look up Audley "SAPROGRAM" Burke in the search box and send us a friend request.

Why Wait? Join Now!



CONGRATULATIONS
TO THIS YEAR'S WINNERS

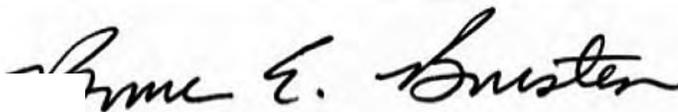
2007–2008
STUDENT AFFILIATES
CHAPTER AWARDS

One of the great joys I have as ACS president is to highlight the many ways in which ACS is fulfilling its vision: Improving people's lives through the transforming power of chemistry. It is clear that Student Affiliates chapters at colleges and universities across the country are making a significant contribution toward this goal.

I am continually impressed by the creativity and enthusiasm of the Student Affiliates and their faculty advisors – your dedication and commitment have made this another remarkable year for ACS! The future of science in the United States is in good hands, and ACS simply would not be the same without you.

Looking ahead, I encourage you to continue your award-winning ways: developing and exercising leadership skills, building strong networks of mentors, colleagues, and friends, and taking advantage of all the development opportunities ACS has to offer. And – to reiterate the message I have shared with countless audiences during my presidential year – remember that you are a big part of celebrating the centrality of chemistry in pushing science forward and solving challenges in our world.

I wish you a safe, happy, and healthy holiday season!



E. Bursten
resident

Another year has passed, and the ACS Committee on Education has selected Student Affiliates chapters to receive special recognition for the programs and activities described in their chapter reports. The awardees will be honored at the 237th ACS National Meeting in Salt Lake City, UT on Sunday, March 22, 2009. Listed below are the *winning institutions*, **chapter presidents**, and faculty advisors. Congratulations to all!



OUTSTANDING

Austin Peay State University, Clarksville, TN

Paul Maizan
Amanda Crook
Carrie Brennan

Barry University, Miami Shores, FL

Adauri Soprani
Yaneriys Cruz
George Fisher

Carroll College, Waukesha, WI

Ashley LaMontagna
Jasen Stephany
Michael Schuder

Central Michigan University, Mount Pleasant

Rachel A. Young
Cynthia Aguirre
Sharyl A. Majorski, Dale J. LeCaptain

Eastern Oregon University, La Grande

Matthew Bechaver
Julia Deutsch
Anna G. Cavinato

The Evergreen State College, Olympia, WA

Mikako Gillespie
Joe Ladd
Dharshi Bopegedera

Florida International University, Miami

Stefano Boulos
Nicole Salazar
Konstantinos Kavellieratos, Piero Gardinalli

*Florida International University-Biscayne Bay
Campus, North Miami*

Mariano Amicarelli
Daniel Macadar
Mayra Exposito

Frostburg State University, Frostburg, MD

Christa Kucharczyk
Betheny Becker
Don Weser

*Georgia College and State University,
Milledgeville*

Benjamin Barfield
Katherine Harper
Catrena Lisse

Illinois Valley Community College, Oglesby

Erin Wiedmann
Joe Moore
Matthew Johll

*Inter American University of Puerto Rico-
San Germán*

Lacemar Garcia
Ángel Vega
Angela Gonzalez

Lander University, Greenwood, SC

Christopher Vaughn
Akeem Cruick Shank
Ralph Layland, Peter Vahjen

Newberry College, Newberry, SC

Barrick Stanley
Angela Amick
Christina McCartha, Sidney Parrish

*Northern Kentucky University,
Highland Heights*

Rebecca Seger
Keith Walters, Heather Bullen

*Northwestern State University,
Natchitoches, LA*

Stacy Miller
Bilal Khurshid
Gillian Rudd

Santa Clara University, CA

Christine Donohoe
William Whitener
Linda Brunauer

South Texas College, McAllen

Faviola Flores
Diego Trevino
Ludivina Avila

Southwestern College, Chula Vista, CA

Mark Gianino
Donna Yee
David Brown

*Stern College for Women-Yeshiva University,
New York, NY*

Grace Charles
Rebecca Katz
Chaya Rapp

Texarkana College, TX

Maria Vera
Sarah Khoury
Patricia Harman, Mike Buttram

Union College, Schenectady, NY

Olga Davydenko
Amanda Barrow
Mary Carroll, Laura MacManus-Spencer

Union University, Jackson, TN

Sarah Conway
Kent Willis
Charles Baldwin, Randy Johnston

University of Arizona, Tucson

Danielle Correia
Trahern Jones
John Pollard

University of Detroit Mercy, MI

Lindsey Cullen
Hana Attar
Matthew Mio

*University of Mary Hardin-Baylor,
Belton, TX*

Shannon Woodruff
Jennifer Lapierre, Darrell Watson

University of Michigan-Flint

Brendan Yonke
Anna Stanczyk
Jessica Tischler

University of Northern Colorado, Greeley

Ryan Miwa
Tyler Takeshita
Kimberly Pacheco

University of Pittsburgh, PA

Max Osipov
George Bandik

University of Pittsburgh at Titusville, PA

Garrett Britton
Yori Synder
Ping Furlan

University of Puerto Rico at Arecibo

Ada Gonzalez
Sergio Cardona
Vanness Montalvo-Rivera
Emiliano Garcia-Maldonado



*University of Puerto Rico-Río Piedras
Campus, San Juan*

Gabriel Reyes
Ingrid Montes

University of Puerto Rico-Aguadilla

Alexandra Mendez Ruiz
José Esteves Villanueva
Sonia Rivera, Rafael Estremera-Anduja

University of Puerto Rico-Mayagüez Campus

Lizabeth Ruiz
Sara Delgado, Nilka Rivera

University of St. Thomas, Houston, TX

Amy Dinh
Daniel Schwartzburg
Thomas Malloy, Jr.

University of Tennessee at Martin

Robert Mitchell
Christy Lowe
S.K. Airee

University of Texas at Tyler

Adam Lankford
Abigail Green
Neil Gray, Tanya Shtoyko, Jason Smee

Utah State University, Logan

Sara Huefner
Rob Severinsen
Lisa M. Berreau

Wilkes University, Wilkes-Barre, PA

Kenneth Green
Elise Serembus
Donald Mencer, Henry Castejon

*West Virginia University Institute of
Technology, Montgomery*

Andrea Ard
Kelly Mills
Jay Wiedemann, Richard Schoening

Xavier University of Louisiana, New Orleans

Trevonne Walford
Shari Johnson
Michael Adams

Aquinas College, Grand Rapids, MI

Lianne Griffiths
Kathleen Pollock
Li-Hen Chen, Elizabeth Jensen

*Armstrong Atlantic State University,
Savannah, GA*

Eugenia Narh
Kruti Desai
Brent Feske, Clifford Padgett

Augustana College, Sioux Falls, SD

Colin Taphorn
Jetty Duffy-Matzner

Ball State University, Muncie, IN

Christopher Suskovich
Svetlana Pekovic
Jason Ribblett

Belmont University, Nashville, TN

Elizabeth Repasky
Alison Moore, Rachel Rigsby

Bucknell University, Lewisburg, PA

Adam Catherman
Greg Manley
Karen Castle

California State University, Chico

Kimberly Bacigalupo
Jillian Hostetter
Christopher J. Nichols

*California State University-Dominguez
Hills, Carson*

Julissa Castaneda
Sofia Papatheodorou

Canisius College, Buffalo, NY

Adam Pendleton
Phillip Sheridan

Carlow University, Pittsburgh, PA

Bonnie Merchant
Kristen Carlisle
David Gallaher, Monique Shumaker

Catawba College, Salisbury, NC

Angela Bailey
Mary Black
Mark Sabo

*College of Mt. Saint Vincent/
Manhattan College, Riverdale, NY*

Michael Magner
Pamela Kerrigan, Andrew Winka

College of Saint Elizabeth, Morristown, NJ

Viktoriya Davaeva
Anna Konel
Sister Marian José Smith

Duquesne University, Pittsburgh, PA

Lauren Matoszuik
Medhavi Bole
Jeff Evanseck, Paul Johnson

Eastern Illinois University, Charleston

Rebecca Grove
Matthew Unterfenger
Edward Treadwell, Scott Tremain

Ferris State University, Big Rapids, MI

Christopher Beier
Carolyn Dienes
Pasquale DiRaddo

Florida Southern College, Lakeland

Justin Massing
Kyle Yerton
Carmen Gauthier

Georgia Southern University, Statesboro

James Davis
Michele McGibony

Glenville State College, WV

John Brown
Krista Duncan
Kevin Evans, Jake McDougal

Henderson State University, Arkadelphia, AR

Chad SeEVERS
Michael Halton
Janice O'Donnell

Indiana State University, Terre Haute

Rachael Chase
Amanda Melberg
Laurence Rosenhein

Lambuth University, Jackson, TN

Lisa Newsom
Brent Pierce
Donna K. Howell, Kevin A. Boudreaux

Linfield College, McMinnville, OR

Jeneva Foster
Janine Lee
Brian Gilbert, Thomas Reinert

Longwood University, Farmville, VA

Russell Farmer
Jason Mann
Lyndsey Riddle
Melissa Rhoten



Angelo State University, San Angelo, TX

Brian T. Terrell
Caitlin Cozby
Donna K. Howell, Kevin A. Boudreaux

Los Angeles City College, CA
Wali Muhammad
Daniela Moreno
 Terry Boan

Millersville University, PA
Rebecca Butt
 Lyman Rickard, Laura Anna

Millikin University, Decatur, IL
Andrew Dunn
Shawn Daniel
 George Bennett

Minnesota State University, Moorhead
Mike Caspers
Kristoffer Brandvold
 Asoka Marasinghe, Joe Provost

Missouri University of Science and Technology, Rolla
Brandi Clark
Alan Windhausen
 Thomas Schuman, Terry Bone

North Dakota State University, Fargo
Danielle Vaughn
Adam Wohl
 Seth Rasmussen

Northeast Texas Community College, Mt. Pleasant
Jessica Holt
Shelley Cooner
 James Archer, Lawrence Brough

Northeastern University, Boston, MA
Andrea Lebed
Erin Ronayne
 Thomas Gilbert

Northwestern University, Evanston, IL
Sharan Srinivasan
Rene Boiteau
Brian Apel
 SonBinh Nguyen

Ohio Northern University, Ada
Danielle Slomberg
Nicole Hune
 Tevye Celius

Ouachita Baptist University, Arkadelphia, AR
Emily Smith
Amanda Berry
 Martin Perry, Joe Bradshaw

Pontifical Catholic University of Puerto Rico, Ponce
Christymarie Rivera
Ailen Serano
 Carmen Collazo

Roger Williams University, Bristol, RI
Jack Fuller
 Stephen O'Shea

Saginaw Valley State University, University Center, MI
Elizabeth Lyons
 David Karpovich

Saint Francis University, Loretto, PA
David Kirby
Aaron Osysko
 Nathan Malavoti, Edward Zovinka

Saint Louis University, MO
Jaya Badhwar
Abigail Young
 Brent Znosko

Southern Illinois University-Edwardsville
Mariellen Sydow
Dylan Downs
 Susan Wiediger, Cristina DeMeo

Tarleton State University, Stephenville, TX
Elizabet Martinez
Katie Dodds
 Linda Schultz, Howard Nance

Temple University, Philadelphia, PA
Allison Pymer
Nooshin Asadpour
 Eric Borguet

Texas A&M University-Kingsville
Hannah Romo
Jeremy Gonzalez
 Thomas Hays

Truman State University, Kirksville, MO
Dmitriy Chernookiy
Josh Blechle
 Barbara Kramer

Tuskegee University, AL
Charmaine Tutson
Antonio Hayes
 Barbara Rackley, Albert Russell

University of Alabama at Birmingham
Sonja Brooks
Rene Hammer
 Jacqueline Nikles, Gary Gray

University of Central Oklahoma, Edmond
James Henderson
 Dallas New, Michael Ferguson

University of Georgia, Athens
Keegan Soncha
Anna Hudson
 James Anderson

University of Houston, TX
Saba Javed
Jimmy Do
 Simon Bott

University of Kentucky, Lexington
Olivia Ringo
Shawn Murphy
 Stephen Testa

University of Louisiana at Lafayette
Byron Hills
 Augusto Gallo, Kathleen Knierim

University of Mary Washington, Fredericksburg, VA
Jennifer Yox
Rebecca Funkhauser
 Leanna Giancarlo

University of Michigan-Ann Arbor
Rebecca Siegel
Stephen Martin
 Paul Jones

University of Minnesota-Morris
Janice Lee
Kyung Mee Lee
 Nancy Carpenter, James Togeas

University of Nebraska at Kearney
Danielle Policarpio
Amanda Huerta
 Annette Moser

University of Northern Iowa, Cedar Falls
Megan Kelly
Rebecca Urlsin
 Dawn Del Carlo

University of Puerto Rico at Cayey
Adamari Rivera
 Elba Reyes

University of Puerto Rico-Humacao
Wilanet De La Cruz
Carla Davila
 Juan Suarez



University of Texas at Dallas, Richardson

Khoan Vu
Stephanie Ceniza
John Silbert, IV

University of West Florida, Pensacola

Tyler Butler
Scott Shaw
Michael Huggins, Pamela Vaughan

*Washington and Jefferson College,
Washington, PA*

Gregory Ratti
Lindsay Leone
Nobunaka Matsuno

Waynesburg University, PA

Megan Orndoff
Amanda Hoffman
Robert LaCount, Evonne Baldauff

*Western Connecticut State University,
Danbury*

Meredith Liberto
Alexander Csengery
Paula Secondo

Western Kentucky University, Bowling Green

Amanda Moore
Rui Zhang

Western Washington University, Bellingham

Brooks Ohlson
Scott Fayer
Steven Emory

Westminster College of Salt Lake City, UT

Amberlyn Peterson
Willie Gilbert
Paul Hooker

Winston-Salem State University, NC

Carla Huaman
Liliana Garcia, Kenneth Brown



Agnes Scott College, Decatur, GA

Evan Joslin
Sarah Swygert
Thomas E. Venable

Albany State University, GA

Allyssa Spellman
Natalie Redmon
Louise Wrensford, Oneil Smith

Alvernia College, Reading, PA

Andrew Shearer
Diane Stopka
Rosemarie Chinni, Kevin Burns

*Anne Arundel Community College,
Arnold, MD*

Adetoun Taiwo
David Kaye
Lynn Tracey

Arkansas State University, Jonesboro

Shannon Hutson
Amanda Harvey
Mark Draganjac

Augustana College, Rock Island, IL

Haroon Hussain
Charles Serrano
Mary Biggin, Sally Burgmeier

Bradley University, Peoria, IL

Geoff Girsch
Kylee Korte
Dean Campbell

Butler University, Indianapolis, IN

Jennifer Osborne
Amy Stafford
John Esteb, Michael Samide

Carson-Newman College, Jefferson City, TN

Justin Quinn
Christine Dalton

Centenary College of Louisiana, Shreveport

Cara Miccoli
Joshua Lawrence, Mary Garrett

Clarion University of Pennsylvania

Justin Rock
Misti Horner
Jonathan Touster, Cory DiCarlo

Clemson University, SC

Chris Pollock
John Kaup

Coe College, Cedar Rapids, IA

Amanda Stegemen
Matt Sonntag
Martin St. Clair, Maria Dean

Cornell College, Mount Vernon, IA

Terese Beary
Nakyda Dean
Craig Teague

Delta State University, Cleveland, MS

Bonnie Williams
Leigh Pyron
Alline Somlai

Drury University, Springfield, MO

Komal Rastogi
Mike Kabonci
Scott Petrich

East Los Angeles College, Monterey Park, CA

James Duran
Raymond Diaz
Veronica Jaramillo
Armando Rivera-Figueroa

East Stroudsburg University of Pennsylvania

Cayce Neyhard
Maria Capocci
John Freeman

Elizabethtown College, PA

Natalie Fickel
Shannon Wallen
Kristi Kneas

Emory University, Atlanta, GA

Thalvinder Sangha
Manvi Anand
Tracy Morkin

Francis Marion University, Florence, SC

Katie Lewis
Tara Eaddy
Jennifer Kelley, T. J. Anderson

Georgia Institute of Technology, Atlanta

Ignacio Becerra-Licha
Suzy Beckham

Grand Valley State University, Allendale, MI

Uma Mishra
Jenna Tomlinson
Rachel Zoet
Rachel Powers, Matthew Hart

Grove City College, PA

Ruth Gonnella
Alexandra Jensen
Harold Conder, Charles Kriley

Hartwick College, Oneonta, NY

Karah Lajeunesse
Christian Janowski
Susan Young

Hope College, Holland, MI

Abby Goltz
Jessica Pustelak
Jason Gilmore

Illinois Wesleyan University, Bloomington

James Christensen
Matthew Huddle
Rebecca Roesner

Iona College, New Rochelle, NY

Loreta Geneviciute
Sunghee Lee, Jerome Levkov

Jacksonville State University, AL

Michael Campbell
Jacbo Boydston
Alfred Nichols, Andrew Helms

James Madison University, Harrisonburg, VA

Allyson Jones
Matthew Ross
Kathryn Layman, Rosa Rivera-Hainaj

Juniata College, Huntingdon, PA

Joseph Houck
Kara George
Tom Fisher

Keene State College, NH

Joseph Meany
Ben Michelson
Colin Abernethy, Denese Junge

Kennesaw State University, GA

Dayne Fraser
Lindsay Harris
Christopher Dockery

Lehigh University, Bethlehem, PA

Beth Careyva
Jeanne Berk

Lock Haven University of Pennsylvania

Ashlee Gerardi
Broc Smith
Brent May, Kevin Range

*Louisiana State University and A&M College,
Baton Rouge*

Elizabeth Lissy
Paul Russo, Carol Taylor

Manchester College, North Manchester, IN

Fiona Mills-Groninger
Amanda Patch
Susan Klein

*Middle Tennessee State University,
Murfreesboro*

Kristy Stanislav
Taylor Barnes
Gary White, Andrienne Friedli

Minnesota State University, Mankato

Marjorie Ploeger
Chad Kratochwill
Trenton Vorlicek

*Missouri Western State University,
Saint Joseph*

Lindsay Goforth
Beth Meyer
Shauna Hiley, Steven Lorimor

Monmouth College, IL

Antonella Magnelli
Sarah Nokes
Laura Moore, Audra Sostarecz

Morgan State University, Baltimore, MD

Sabrina Bell
Louise Hellwig

*Mount Saint Mary's College,
Los Angeles, CA*

Pa Vue
Alexis Brown
Deniz Cizmeciyan, Jennifer Chotiner

*North Carolina A&T State University,
Greensboro*

Brandi Johnson
Marion Franks, Etta Gravely

Pacific Lutheran University, Tacoma, WA

Eric Gordon
Mycah Uehling
Craig Fryhle

Pennsylvania State University, University Park

Tory Miksiewicz
Chandra Richards
Jackie Bortiatynski, Chris Falzone

Point Loma Nazarene University, San Diego, CA

Ryan Weiss
Kristin Mitrovich
Sara Choung

Radford University, VA

Amanda Neighbors
Robyn Amos-Kroohs
Cindy Burkhardt, Joseph Wirgau

Roanoke College, Salem, VA

Samantha Strickland
Rachel Vanderslice
Benjamin Huddle

Sacred Heart University, Fairfield, CT

Joe DePalma
Rachel La Terra
Linda Farber

Saint Mary's College, Notre Dame, IN

Christine Herdman
Brittni Qualizza
Colleen McGowan
Isabel Sanchez

Saint Vincent College, Latrobe, PA

David Deglau
Laura Echard
Jason Vohs

Salem College, Winston-Salem, NC

Rhea Williams
Nita Eskew

Samford University, Birmingham, AL

Jonathan Risner
Sam Douglas
Barrett Worley
Brian Gregory

San Jose State University, CA

Anne Knight
Madoka Gasper
Gilles Muller

Seattle University, WA

Matthew Ryskalaczyk
Abigail Greibenow
Peter Alaimo, Ryan McLaughlin

Seton Hill University, Greensburg, PA

Autumn Himes
Nicole Klein
Susan Yochum

Shippensburg University of Pennsylvania

Matthew Smith
Cristina Saaco
Curtis Zaleski, Thomas Frielle

Simmons College, Boston, MA

Amanda Larson-Mekler
Daniella Plourde
Richard Gurney

*South Dakota School of Mines and
Technology, Rapid City*

Kirre Wold
Dale Arrington

Southern Methodist University, Dallas, TX

Afsha Rais
Emily Stuart
Brent Sumerlin, Ling Hua



Southwest Minnesota State University,
Marshall

Matthew Bruzek

Robin Hull

Noelle Beyer, Frank Schindler

Spelman College, Atlanta, GA

Andraya Johnson

Lauren Sneed

Kimberly Jackson, Nripendra Bose

St. John's University, Queens, NY

Aatift Tirmizi

Amy Wong

Neil Jespersen

Stonehill College, North Easton, MA

Devon Heath

Priscilla Tanger

Cheryl Schnitzer, Marilena Hall

Suffolk University, Boston, MA

Adam Marchetti

Jonathan Urbanczyk

Doris Lewis

Tennessee Technological University,
Cookeville

Becca Newhouse

Daniel Swartling

Texas Tech University, Lubbock

Christian Guerrero

Robert Blake

The College of New Jersey, Ewing

Jennifer Woodring

Brittany Speer

David Hunt

Transylvania University, Lexington, KY

John Kromer

Gerald Seebach, Eva Csuhai

Trinity University, San Antonio, TX

Gretchen Vincil

Paul White

Adam Urbach

University of Arkansas-Little Rock

Celeste Cole

Casee Lemons

Jerry Darsey

University of Central Arkansas, Conway

Leah Thompson

Tori Green

Kyle Felling, Karen Steelman

University of Central Missouri, Warrensburg

Jill Williamson

Renee Cole

University of Colorado-Colorado Springs

Amanda Loh

Chris Janes

David Weiss

University of Connecticut, Storrs

Ron Ramsubhag

Mark Peczuh, Tyson Miller

University of Illinois at Urbana-Champaign

Christopher Schlosberg

Jonathan Bushspies

Lauren Denofrio, Jesse Miller

University of Maryland, Baltimore County,
Baltimore

Shane Bawek

Kezia Alexander

Tara Carpenter

University of North Carolina at Pembroke

James Sibbett

Edgar Mendoza

Meredith Storms

University of Portland, OR

Eric Davis

Angela Hoffman

University of San Diego, CA

Will Porterfield

Ashley Corrigan

Debbie Tahmassebi

University of Southern Indiana, Evansville

Maggie Schnorbus

Evan Millam, Ken Walsh

University of Southern Maine, Portland

Kristopher Fecteau

Sri Dhyana

Lucille Benedict, James Ford

University of St. Thomas, St. Paul, MN

Joshua Speros

Tom Ippoliti, Anthony Borgerding

University of Tennessee at Chattanooga

Meetal Vashi

Breann Reinhold

Manuel Santiago

University of Texas of the Permian Basin,
Odessa

Jessica Lee

Robert Vasquez

Kyle Beran

University of Toledo, OH

Mike Matzke

Matt Pocino

Edith Kippenhan, Andy Jorgensen

University of Utah, Salt Lake City

Natalie Bjorge

Joe Marchese

Anita Orendt

University of Wisconsin-Eau Claire

Clinton Cook

David Witte

Kurt Wiegel, James Boulter

University of Wisconsin-Madison

Kittikhun Wangkanont

Gregory Peters

Ieva Reich

University of Wisconsin-Platteville

Sarah Whiteman

Tricia Mason

Timothy Zauche

Utica College, NY

Emily Corcoran

Amanda Murphy

Michelle Boucher

Valdosta State University, GA

Pavi Elle Lockhart

Kylah Smith

Bobby Ifebou

Donna Gosnell, Gary Wood

Washburn University of Topeka, KS

Sean Armstrong

Renae Solko

Shaun Schmidt

Washington College, Chestertown, MD

Chelsea Crum

Alex Starks

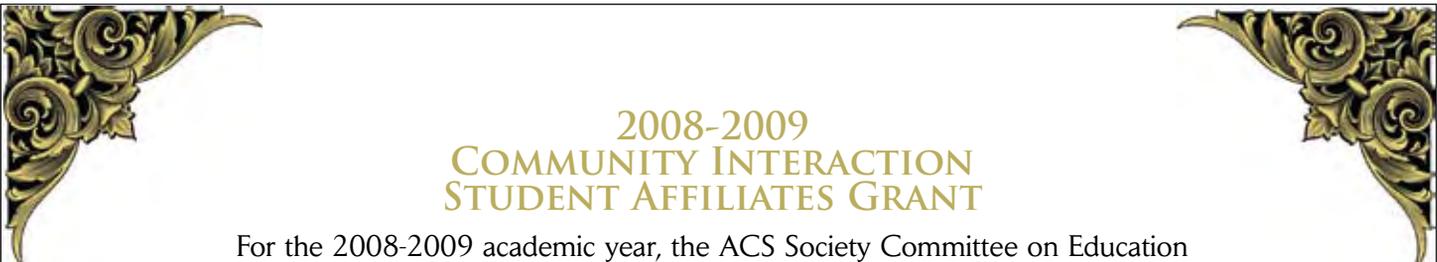
Anna Marteel-Parrish, James Locker

West Virginia University, Morgantown

Samuel Hall

Jonah Womack

Harry Finklea



2008-2009 COMMUNITY INTERACTION STUDENT AFFILIATES GRANT

For the 2008-2009 academic year, the ACS Society Committee on Education has awarded the following six projects with CISA grants to provide pre-college minority students with enriched hands-on science activities. Listed below are the *chapters*, **student project directors**, **faculty advisors**, and *project titles*.

Eastern Oregon University

Wade Elliott

Anna Cavinato

Kids Connecting to Chemistry: Science Outreach Activities for Minority Students in Eastern Oregon

North Carolina Central University

Maian Lopian

Tiffany Buchanan

Jon Meyers

North Carolina Regional Science Bowl Project

Rutgers University at New Brunswick

Andrew Harrison

John L. Taylor

Rutgers Chemistry Society's Chemistry Connection Project

Lake Forest College

Emily Pospiech

Elizabeth Fischer

A Measure of Our Success

Northwestern University

Ben Dunnington

SonBinh T. Nguyen

ScOPE Community Outreach Project

Xavier University of Louisiana

Lauren Ausama

Julian McKnight

Mike Adams

KIPP Academy Saturday Science Program

2008-2009 INNOVATIVE ACTIVITIES GRANT

For the 2008-2009 academic year, the ACS Society Committee on Education has selected six IAG proposals to receive funding. Listed below are the *chapters*, **student project directors**, **faculty advisors**, and *project titles*.

Clemson University

Chris Pollock

John Kaup

Presidential Video Challenge Competition

Spring Arbor University

David Sellers

Brooke Cooper

Bruce Baldwin

Biodiesel for a Greener Campus

University of Michigan-Flint

Danielle Borgerding

Jessica Tischler

2nd Annual Battle of the Chemistry Clubs

Iona College

Aileen Hilario

Sunghoo Lee

Having a Ball with Chemistry

Stern College for Women-Yeshiva University

Grace Charles

Chaya Rapp

Chemistry's Role in Fighting Global Warming

Waynesburg University

John Paiani

Robert LaCount

Incorporating Science into Culture: Halloween Edition

2007-2008 GREEN CHEMISTRY STUDENT AFFILIATES CHAPTERS

Augustana College, SD

Canisius College

Carroll College

Central Michigan University

Ferris State University

Hendrix College

James Madison University

Longwood University

Manchester College

Missouri University of Science and Technology

Saint Louis University

Simmons College

South Texas College

Stern College for Women-Yeshiva University

Texarkana College

University of Arizona

University of Detroit Mercy

University of Michigan-Ann Arbor

University of Northern Colorado

University of Pittsburgh

University of Pittsburgh at Titusville

University of Puerto Rico at Arecibo

University of Puerto Rico-Río Piedras Campus

University of Puerto Rico-Mayagüez Campus

University of Tennessee at Martin

Western Washington University

THE CHEMISTRY OF Forensics

BY ALLISON BYRUM PROFFITT

TODAY, G. MICHELE YEZZO'S SAMPLE COMES IN A paper bag — no sterile reagent bottles for her. “Unlike other areas of chemistry, much of our evidence is not nice, pristine pieces of metal or paper or chemicals in test tubes or bottles,” she says.

Yezzo is a forensic scientist in the Trace Evidence Analysis Unit of the State of Ohio Bureau of Criminal Identification and Investigation (a section of the Ohio Attorney General's Office). In the case of a hit-and-run fatality, Yezzo mentions as an example, “someone's clothing has been submitted and their clothing may have a clue as to who hit them.”

Collecting and analyzing these clues from clothing, weapons, or other samples found at a crime scene is the job of a forensic chemist. The term ‘forensics’ encompasses many different areas and types of work. Forensic chemists (as opposed to forensic psychologists, anthropologists, digital experts, or other professionals) analyze evidence using chemistry.

This time, Yezzo's bag of clothing contains the uniform of a police officer who was struck and killed by a vehicle. Yezzo gathered evidence from the clothing and used it to provide detectives with information useful to their investigation.

Chipping away at the evidence

Yezzo collected paint chips from the victim's clothing and analyzed her findings using an international database of vehicular paint samples called Paint Data Query (PDQ). “The analysis involves microscopic examination of the samples to determine color, layer structure, and appearance,” she says. Paint chips are analyzed via Fourier Transform Infrared Spectrometry (FTIR). “This process involves identifying organic and inorganic components of the paint.” By searching for this information in the PDQ

database, the analysis yields the manufacturer, model(s), and year(s) of vehicles that are possible matches for the paint sample.

A good deal of a forensic chemist's work is instrumental analysis, says Darrell Davis, laboratory director at the Drug Enforcement Administration's (DEA) South Central Laboratory in Dallas, Texas. Davis has been a forensic chemist for over 29 years with DEA, originally on the bench analyzing samples for the presence of controlled substances at the Southwest Laboratory in San Diego, and later managing the DEA lab in Dallas.



Forensic chemists Dale Norwood, Kiana Hamlet, Angel Ramirez, and Darrell Davis at the DEA Laboratory in Dallas, TX.

COURTESY OF DEA LABORATORY, DALLAS



JUPITERIMAGES

Davis says that the DEA's work is "mostly analytical [chemistry], both qualitative and quantitative. We not only identify the controlled substance and its constituents ... we also quantify the controlled substance to let the courts and special agents know how pure the sample is. For example, we might analyze a kilogram of a cocaine-like substance and determine that 80% of that weight is pure cocaine."

In order to do these analyses, the chemists in Davis' lab use mass spectrometry, infrared spectroscopy (IR), gas chromatography (GC), and liquid chromatography (LC). "We also use NMR [nuclear magnetic resonance] on the more complex types of samples."

Jennifer Bresett is a serologist at the Baltimore City Police Department and her job consists of analyzing evidence from cases for biological fluids – blood, saliva, semen – to be tested for DNA. "We do chemical tests; we test to see if the evidence is actually blood, or if there is seminal fluid present, or if microscopically we can identify sperm. A lot of [the tests] are color change tests. We do an LMG [leucomalachite green] test, which is a presumptive test for blood; we do HemaTrace and p30 cards, which are confirmatory tests for blood and seminal fluid... We have reagents that are specifically made to identify what type of fluid or biological material you have." Once Bresett has identified any biological fluids, she packages the sample and sends it to the DNA lab.

Taking the forensic path

All of these individuals graduated with degrees in chemistry, and later found their way into forensics. Davis interviewed with DEA at a National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCChE) conference in 1979 and began work after graduation. Yezzo earned a bachelor's degree in comprehensive sciences with a concentration in chemistry and biology and a minor in criminal justice. Originally, Bresett was enrolled in a chemistry/pre-pharmacy program. However, after hearing a forensic chemist speak at an ACS meeting and trying a forensics internship, she kept a major in chemistry, tailored her coursework toward forensics, and completed an internship at the Baltimore City Police Department. Recently, she finished her master's in forensic science.

Each of these professionals stresses the importance of having both a strong science background and an internship in forensics. In fact, a chemistry-heavy background is

often required. DEA requires at least 30 semester hours of chemistry, and most other laboratories are similar. DNA departments often require additional coursework in genetics, molecular biology, biochemistry, and statistics. "Not everyone understands how much science is involved in forensics," says Bresett. "[Students] need to be in a strong science program."

Hands-on experience is also crucial. Yezzo, who has been a forensic scientist for over 30 years, highly recommends internships. She points out that forensics isn't for everyone: "People may decide, 'Gee, I'm scared of blood,' or 'Gee, I don't want to handle firearms.'" She believes internships prevent these sorts of surprises for both the employee and employer.

Internships or job shadowing also help students identify which areas of forensics they may want to pursue. Jimmie Oxley, a professor of chemistry at the University of Rhode Island and the head of its forensics program, encourages students to think outside the box, and consider the many possibilities beyond crime labs. "They often think that doing forensics means only one thing: working in a crime lab."



COURTESY OF DEA LABORATORY, DALLAS

Forensic chemist Norwood and laboratory director Davis review IR spectra.



JUPITERIMAGES

Yet there are only about 400 crime labs in the nation. So students need to know that forensic scientists also work in many other settings." She reels off the list: private firms, paternity suits, drug testing, and "determining why this bridge fell down and whose fault it is." "I try to help students realize that 'this, too, is forensics,'" she says.

Bresett agrees. "[Students] need to [be] checking out different labs, talking to different units... Forensics is so wide; you can go into serology, drugs, latents [analyzing fingerprints left at a crime scene], so you need to go and see what each one's like and what you think you'd like to do."

Communicating and cooperating

Of course, forensics doesn't all happen in the laboratory. Forensic chemists are also asked to communicate with detectives and law enforcement officers, and testify in court. "It's probably 80% in the lab," Bresett says of her time, "and then you write your reports and distribute them and spend the rest of the time talking with people to learn more about the cases you're working on. After you send in your report, you may be asked to go to court to testify."

"The job's never finished until the paperwork's done," Yezzo jokes. "Take copious notes," she advises. "Working in this field, there are a few important keys to success: good note-taking, communication, and science. I can't say one over the other... It's a combination; you've got to have all three."

Yezzo says cooperation is essential to forensics. "Unlike Grissom [from the TV show *CSI*], we do rely on people with expertise in other areas, and it's a team approach. I can't stress enough the fact that



JUPITERIMAGES

in forensics we rely on people from other specialties and work together. It creates a much better situation as far as the potential for solving any given case."

Closing the case

The joy of solving the case is what really captures the forensic scientist's excitement. "Truthfully, I never have a boring day, and there are not many people who can say that," says Yezzo. "Sometimes it's difficult because you look at the downside of life and what people can do to one another. But the upside is that if you help solve a crime, then that person's not going to go out and commit that act on someone else."

The heart of criminal forensics is solving cases based on the science. "We've had cases where detectives submit the evidence, clearly expecting us to prove that a certain individual did it," says Yezzo. "In fact, we sometimes end up proving that the individual under suspicion didn't do it. That's a really good part of our job as well. Using our scientific knowledge and methods, we can not only confirm the guilty, but also exonerate the innocent."

Maintaining high standards

But with knowledge comes responsibility. Davis believes that especially since the 1994 O.J. Simpson trial, forensics is under a microscope (no pun intended). "Our field is being scrutinized more and more by the court systems and by the general public because we represent 'truth and justice' in our findings. Because of the nature of the job, forensic scientists are held to a high standard."

Consequently, Davis believes integrity to be essential to the job. "We have to know that our chemists are following the policies and procedures that are

set forth in the best practices of analyzing controlled substances," he says. "You want to make sure you get people who don't take shortcuts. It always comes back to integrity."

"In our job, the drugs have no face, no ethnicity to them whatsoever. It's white powder; it's brown powder; it's red tablets; it's clear liquid. We analyze it for the presence of controlled substances, pure and simple," says Davis. "We have a mission and we can see the end result. That's the plus that I enjoy about it: looking for the unknown and then finding it and reporting it. This is a great career."

Filling the pipeline

"Unfortunately or fortunately," Davis says, "there is job stability working with forensics, because crime is not going away." But he welcomes company in his quest. "I don't believe we have enough candidates for all the jobs we have in forensics," he says.

The field is still certainly accessible to graduates with bachelor's degrees, and it's seeing an influx of master's degrees and even Ph.D.s. The requirements are still the same: "We're looking for people who have the science background," says Davis.

While Bresett was finishing her science-heavy, forensic science professional master's program at Towson University, she was working full time as a serologist. At Towson, "There were two adjunct professors from the crime lab, which was nice because it made the coursework more hands-on. They know what you're going to do, so they prepare you for it," she says.

Though her schedule was incredibly busy, Bresett found that her coursework and lab work complemented each other. "I think it was great because everything went hand-in-hand... I would leave work and rather than go home and study what I'd learned, I'd go to school and learn more."

Bresett took microscopy and serology classes that are enhancing her current job, and DNA classes that will help her move into a DNA position in the future. She's preparing for a career of growth. With so many different types of forensic work and such a rapidly-growing field, the opportunities are endless – even if they aren't always true to TV.

"Almost every speaker we have says, 'Unlike *CSI*...,' but *CSI* does accomplish something very good in that it gets [students] interested in the first place," says Oxley. And that interest, coupled with a strong chemistry background, opens many doors. **IC**



G. Michele Yezzo conducts glass analysis using the Glass Refractive Index Measurement instrument.



ALLISON BYRUM PROFFITT is a freelance writer based in Cambridge, Massachusetts.

A collection of cosmetic brushes and products. Three brushes are shown at the top, each with a different colored powder (dark brown, reddish-brown, and red) being applied to a white surface. Below them is a collection of various cosmetic items including a lipstick, a blush compact, a foundation compact, and a mascara tube.

Cosmetic Chemistry

*The beauty of finding
one's own career path.*

BY KRISTIN D. COLLINS

AS A YOUNG GIRL GROWING UP IN Pittsburgh, Yolonda Sales (picture on right) never dreamed of working as a chemist in the color cosmetics division of a major company. Sales graduated high school with the goal of attending cosmetology college and opening a beauty salon. In 1992, she enrolled in the Pittsburgh Beauty Academy, spending her days learning such skills as how to properly apply make-up, cut hair, and give massages.

However, after five years of enhancing people's looks, Sales decided she wanted a new challenge. "I wanted more of the design rather than the execution," the 34-year-old explains of her reasons for changing her career focus. "So, I thought, what other careers could I get into?"

The answer to her question appeared in the form of a brochure. While leaving the beauty academy one day, Sales noticed a brochure that described cosmetic chemistry as a career option. "It's something I had never thought about," she explains. But Sales did think, "it would be fun to create the make-up or the shampoo."

Sales realized she would need a bachelor's degree in chemistry to turn her new career goal into a reality. After some soul-searching,

she decided to return to school at the University of Pittsburgh. Sales began her studies slowly, taking one or two introductory chemistry classes. After learning about chemistry, she realized, "I can do this!" Sales then took some summer courses and eventually enrolled at the university as a full-time student.

Hard work and a clear goal

Sales recalls her days of taking analytical chemistry during her junior year at the University of Pittsburgh. She found the constructs and concepts of the subject "amazing," and also enjoyed the teaching style of her chemistry professor, Steve Weber, whom she recalls as "a dynamic individual. We had a good rapport."

Weber explains that a year after Sales took his class, she approached him and said that she needed to do research and learn high performance liquid chromatography (HPLC). "I gladly brought her in and gave her the tools and software to do the work," Weber says. Sales notes that the opportunity enabled her to become more confident in her skills.



University of Pittsburgh's chemistry professor Steve Weber.

ISTOCKPHOTO

ISTOCKPHOTO

As the two began working together, Weber soon discovered that Sales was formulating her own cosmetics in her free time. "How she found the time in a day to do everything with enthusiasm and a smile is unimaginable," Weber observes.

She spent her days taking classes while working in the evenings. "Working while going to school in chemistry was very hard," Sales observes. Even so, months before graduation, Sales knew she wanted to continue her education while working full-time. "I had a game plan. I knew if I got hired by a strong company, they would pay for my graduate studies."

However, getting a job with a large employer was a challenge, Sales recalls. Sales put her interpersonal skills to use by asking her former professor for a reference when she applied to Procter & Gamble. "Yolonda had self-confidence," Weber recalls. "That allowed her to approach me and her other professors."

With a competitive marketplace and so many people vying for a few jobs, Sales notes it is important for students to have technical mastery and finely-tuned interpersonal skills when looking for work. Sales explains that she gained those skills during her research with Weber.

Moving forward

All of Sales' hard work paid off when she graduated with her bachelor's degree in chemistry in April 2004. The following September, she began working at the Procter & Gamble Company, which offered 100 percent tuition reimbursement. Sales had already spent time during her college days in Pittsburgh exploring different graduate programs, and had found one she wanted. She approached her manager and explained to him that she wanted to pursue a Professional Science Master's (PSM) degree while working full-time.

"I wanted a sound education," Sales recalls, adding that it was important to attend a school that was accredited and that would allow her to pursue studies part-time. "When I saw the Illinois Institute of Technology (IIT), it met all of my criteria. I definitely knew I wanted to get started right away," Sales adds. She also wanted hands-on work experience, versus spending time in the world of academia.

Sales' supervisor agreed to the plan. In 2005, Sales enrolled at IIT. For the next two years, Sales studied for her master's degree in analytical chemistry while working as an analytical researcher. Graduation day arrived in May 2007.

What's a Professional Science Master's Degree?

The PSM is a relatively new type of graduate degree that prepares students for a wide range of science-based careers in industry, government, and the non-profit sector. PSM programs offer academic training in emerging or interdisciplinary areas of science or mathematics and in advanced business-related areas, such as management, communications, project management or intellectual property.

These programs are usually overseen by an advisory board of employers, and are especially deft at adjusting to changing workforce demands and technologies, which in turn, make graduates of the programs highly sought after by employers.

PSM degrees typically take two years to complete and include an internship in a relevant "real world" setting. Many employers provide tuition assistance for these programs.

A chemistry background is excellent preparation for PSM programs in chemical entrepreneurship, computational chemistry, materials and chemical synthesis, forensic science, and bioinformatics.

Learn more about the PSM degree:

- "Science + Professional Skills = Formula for Success!" in *Chemistry*, September-October 2007, Volume 17, Number 1, pp. 12-13. <http://www.acs.org/saprogram>.
- "Masters of Industry," *Chemical & Engineering News*, June 16, 2008, Volume 86, Number 24, pp. 65-71. <http://pubs.acs.org/cen/education/86/8624education.html>.
- Go to www.sciencemasters.com.



Why consider a PSM?

The PSM degree can prepare students for work in emerging and existing technical fields outside the university world. Core curricula for the program cover a variety of interdisciplinary science and mathematics fields, as well as classes and training in professional skills that employers desire in employees. A chemistry background is excellent preparation for PSM programs such as chemical entrepreneurship, computational chemistry, materials and chemical synthesis, and forensic science.

Weber continued to play a critical role in Sales' life after she finished her research. The professor wrote her a letter of recommendation when she applied to graduate school.

Sales continued her studies in analytical chemistry to earn her PSM degree. "Pursuing my master's degree online with IIT while juggling a 40-hour work week was challenging and required consistent discipline," Sales says. While earning her master's degree, Sales would start work at 6:00 a.m. and finish at 2:30 p.m. "This early work schedule allowed me to use my entire evening for all of my coursework. Of course, many a Saturday afternoon was sacrificed for assignments as well. But my flexible work schedule definitely made studying easier," she says.



Sales' studies included coursework in science and business. She took science courses in gas chromatography, statistics for analytical chemists, and analytical method development. Business classes included project management, business principles, and communication in the workplace.

Sales observes that the PSM degree is a practical and flexible way for undergraduate students to advance their studies in chemistry. "The PSM degree can provide working professionals the opportunity to broaden their chemistry knowledge without having to give up their careers," she said.

Life at Procter & Gamble

Sales explains that all of the classes she took at IIT are related to her career as an analytical researcher at Procter & Gamble in Hunt Valley, MD.

As an analytical researcher, Sales is responsible for developing methods to characterize the properties of raw materials and products in development. Her lab utilizes a variety of analytical instrumentation and techniques including HPLC, gas chromatography, Karl Fischer titration, and other compendial wet chemical analyses. All of this work is done under Good Manufacturing Practices guidelines, where documentation and attention to detail are crucial. Once these methods are developed and validated, they are transferred to other groups in the company to be used for quality assurance purposes. "We use the information to make sure we are delivering the best product we can," Sales says.

Product development requires working in a team environment. Sales works closely with individuals in regulatory, quality assurance, and safety leadership groups. Chemical safety is another important part of Sales' job. "At Procter & Gamble, the safety of our employees is our number one priority," she observes.

Sales says her work days are varied, depending upon the company's needs. "I'm stimulated and challenged," Sales comments about her position, and notes that she has great co-workers whom she describes as "talented scientists who take a true sense of ownership" with their work.

Sales is responsible for developing methods to characterize the properties of raw materials and products in development.



Sales adds that another advantage of working for Procter & Gamble is professional development. The company offers ongoing training classes for its employees. "They invest in you to make sure you have the skills," Sales says, and observes that the professional development programs have enabled her to network with other scientists and to travel to workshops and conferences.

Looking back, planning ahead

In addition to her own hard work and focus, Sales stresses the key role her professor played in her career. "I was very fortunate to work with Steve Weber," Sales observes. "I believe he was a critical reason why I was hired at Procter & Gamble." Weber adds that is important for students to talk with their professors.

"You never know how they could help you down the road." 



KRISTIN D. COLLINS is a former Web editor in the Education Division at the American Chemical Society. She also works as a freelance writer who has written on science education issues since 2001.

在海外做科学

Faire de la Science a l'Etranger

Studiowanie za granicą

Wissenschaft im Ausland betreiben

Doing Science Abroad

Haciendo ciencia en el exterior

W

BY CHAPIN RODRIGUEZ

HETHER YOUR SCIENCE-RELATED CAREER takes you into research, teaching, administration, writing, or patent law, you will need to be able to work with colleagues from all over the world.

There is no better way to learn how to do that than by experiencing the world first-hand.

Doing science abroad can also make you more attractive to employers. The experiences you gain by learning to adapt to different lifestyles, languages, and cultures can speak volumes to potential employers. For example, it can provide insights into your ability to handle the unpredictability and stresses of research and the capacity to work productively with colleagues and team members who may be very different from you.

For these reasons, you should consider working in a research laboratory or taking science courses abroad as part of your undergraduate studies, or for a year or two after graduation.

"The whole process helped me to mature a lot," says Jordan Fleuriet about his year studying science at the University of Lancaster in England. "You're in a brand-new situation where you don't know anyone and you have to make it on your own." The recent graduate of the University of North Carolina-Chapel Hill also found that this study abroad experience came in handy when he interviewed for his current job at Blue Cross Blue Shield. His interviewer was a serious traveler himself, and Fleuriet was able to speak about how his experiences abroad had helped him cultivate valuable professional skills.

Fleuriet's story is an excellent example of how studying abroad can prepare students for working in a globalized economy, which may be part of the reason why the number of

U.S. students studying abroad has been rising steadily for the past two decades, based on statistics from the Institute of International Education. Although it is often easier for undergraduates

majoring in the humanities, many programs now allow science majors to take advantage of the opportunities and skills that can be gained by living in an unfamiliar country.

All things considered, study abroad can be one of the most exciting, challenging, and fruitful experiences of your life. Perhaps now you're strongly considering studying abroad. If so, here are some recommendations that may help you structure your science learning experience in your adopted country.

Manage your budget

Going to college is never a cheap prospect, and going abroad brings additional concerns about how much things cost and how things 'work over there'; however, it does not need to cost any more than what you're already paying per semester. Several programs cover many or all of your costs and may provide you with a stipend that will give you enough to enjoy life — though probably not enough to save a ton. Only you and your family can figure out what you can truly afford, but be sure to get as much information as you can about what is covered by the program and what isn't. For example, who has to pay for the roundtrip airfare? What about international health insurance?



Katherine Hooks (left) with friends atop Cabot Tower in Bristol, UK.

PHOTOS COURTESY OF KATHERINE HOOKS

Faire de la Science à l'Étranger

To estimate the cost of living abroad, sit down and work through a budget, similar to the way you or your family may already budget for monthly expenses in the U.S. To help you estimate these costs, you may wish to speak with your school's study abroad office, since they may have experience in the country where you're going. It would be ideal if they can put you in touch with students at your school who have studied or spent time in the country or city where you're headed.

If you've decided that study abroad is too expensive, make

sure you've considered all the options, including going for a semester or summer rather than a whole year.

Do your prep work

Get advice from your faculty advisor and from the director of studies for your major(s) on which science courses would be best to study abroad, and which you should probably save for your studies in the U.S. "Getting details laid out before you go is absolutely crucial," notes Fleuriet.



Looking Back at the UK

A year of chemistry in the land of Lord Kelvin, Sir Christopher Ingold, and Rosalind Franklin

BY CHAPIN RODRIGUEZ

Katherine Hooks knew she wanted to go to the United Kingdom (UK), but she figured it would be for just one semester. While a sophomore chemistry major at the University of North Carolina-Chapel Hill (UNC), she learned of the Trans-Atlantic Science Student Exchange Program, or TASSEP. As it turned out, most science courses are year-long in the UK and other countries, so she decided to spend her entire junior year at the University of Bristol. "I am really glad I did," says Hooks, "because it gave me the opportunity to get to know the country and the people better."

Hooks says she liked the depth of her courses at Bristol, and the fact that different parts of her organic chemistry course were taught by different professors based on their particular research interests. "They knew what they were talking about," she adds, "and they were excited about it."

Outside of class, Hooks found plenty of clubs and organizations to get involved in. She played on a Frisbee team, joined a religious club, and also loved experiencing the pubs, clubs, and nightlife.

Hooks advises those looking to do science study abroad to "be open and flexible" about what courses they can take. "Try and take the classes you need," she advises, "but be aware that you may not get all of them." Hooks took the initiative to speak beforehand with faculty at UNC about

which courses to take at the University of Bristol, and worked closely with several departments once she was there. As a result, she was able to receive credit for courses in philosophy, religion, inorganic chemistry, physical chemistry, and organic chemistry, as well as lab courses for the three chemistry classes. The transfer credits she earned from these courses allowed her to graduate on time while gaining a comprehensive education in chemistry.

Hooks credits her experience abroad with changing her view of herself and the world. "My eyes are more open, and I can see past my own university 'bubble.' I learned that I can be a self-starter ... and that I can do well in a foreign country." 



Hooks (left) with her Ultimate Frisbee team at the University of Bristol.



Katherine Hooks traveling in Switzerland during her four-week summer break.

PHOTOS COURTESY OF KATHERINE HOOKS

Haciendo ciencia en el exterior



ISTOCKPHOTO

In addition to the transfer requirements within your major department, be aware that your university may also impose certain conditions or restrictions on transferring credits. For example, you may have to earn a certain minimum grade for the credit to transfer, or you may be limited in how many credits you can transfer per semester. Visit your registrar and the study abroad office to make sure you work within such guidelines.

Even after all your efforts, it may turn out that you cannot go abroad during the academic year. Not a problem. Take a look

at summer programs; they may be convenient ways for you to 'dip your feet' into the global pond while ensuring complete continuity of your studies.

Keep records

Your department may hold off on guaranteeing that your courses will transfer until after they have examined what you actually covered in your lectures and laboratory work. So while abroad, save all of your paperwork as avidly as you catalog and archive your photos of new friends and new experiences. In particular, save your course descriptions, syllabi, experiment lists, and laboratory manuals – anything that may help to show your professors back home what you did while abroad. In my own case, my director of studies waited until after my return to grant me transfer credits for my chemistry courses.



ISTOCKPHOTO

Get involved

You may feel the temptation to treat your studies abroad as a vacation. However, in order to get the most out of your study abroad experience, both personally and professionally, you should strive to maintain the same level of performance and engagement as you would at home. If you enjoy getting involved with student organizations or volunteering in the community, don't shy away from seeking out such opportunities in your adopted home. When I spent my junior year studying chemistry in Madrid, I volunteered on weekends at a residence for the mentally disabled. While Fleuriet was at Lancaster, he

successfully ran for a position in student government. Doing so, he says, allowed him to develop his skills in leadership and planning, which he could discuss confidently later, such as in the interview that led to his current job.

Indeed, David Harwell, assistant director of career management and development at the ACS, observes that employers in the chemical industry value breadth of experience more than the fact that a candidate spent time abroad. Seek out experiences that let you grow in your ability to work with different cultures and different types of people – whether you're studying abroad or back at home.



ISTOCKPHOTO

Follow up when you return

Once you return from your research abroad experience, go back to your director of studies and the registrar and show the necessary documentation to get your credits transferred.

Cherish your memories and know your study abroad experience doesn't just belong to your past. It will remain part of your present and future. You will have accomplished things that not everyone gets to do: you will have successfully navigated living and doing science in another country, perhaps even another language. "It's definitely changed my life," says Fleuriet. "It helped me figure out what I wanted to do in life, which is great."

In fact, the confidence, sense of pride, and broad perspective you gain from doing science abroad may turn out to be the most valuable transfer credits you could ever hope for. **ic**



CHAPIN RODRIGUEZ (rodriguez.chapin@gmail.com) spent his junior year abroad studying chemistry in Madrid through the TASSEP program, and enjoyed it so much that he went to the UK to earn his Ph.D. in biochemistry. Since September 2008, he has been teaching scientific communication at a large medical school in Sichuan Province in China.

Rxn's and Sol'n's

Reactions and Solutions is a blog offering tips on beginning your career and succeeding on the job. It is written by younger chemists in industry and academe.

COMPILED BY LORI BETSOCK

→ BLOG



Is There Life Outside of Chemistry?

The lesson that I have learned is: don't limit your career options to what you have studied. There is an amazing array of career options for the newly-minted scientist.

I graduated with a Ph.D. in physical chemistry and primarily studied semiconductor device physics. I knew that jobs in the semiconductor industry were rapidly being outsourced or were very unstable at best. After a little head-scratching, I realized the skills I acquired in graduate school could be applied in many different areas beyond the semiconductor industry.

I had always been a microscopist. It really doesn't matter what you stick in front of the microscope; the effect is essentially the same. So, I took a postdoctoral fellowship in a structural biology lab using microscopy to determine the structures of proteins. With a couple of years in this field, I landed a great job at a university as an imaging core facility manager and assistant research professor in pharmaceutical sciences. I went from being a graduate student in the semiconductor field to a professor in pharmaceutical sciences in 3 years.

How is this kind of transition possible? Our training in chemistry develops a skill set that translates incredibly well to other disciplines. Most employers are willing to take a chance on someone with an interesting but non-standard background. Don't hesitate to move to a different discipline in science, or even move out of science all together. Your training has prepared you for anything, and it is definitely not wasted if you don't end up at the business end of a rotovap.

Posted by Jonathan



Learn Something from Everyone You Meet

In an undergraduate program, you learn chemistry fundamentals from the university's faculty, teaching assistants, and your classmates. Although new employee training programs vary from company to company, none will be as structured as the class and laboratory settings in your undergraduate education. Feeling confident in your abilities provides a good starting point for your career; however, most technical knowledge is learned on the job.

After spending many years in academia, I transitioned into industry. The first challenge I had to overcome was to change my 10 a.m. to 10 p.m. schedule to a 7 a.m. to 5 p.m. one. It may not sound like a big challenge, but it took me six months to get used to the new schedule. I quickly learned that showing up late at work, even by 5 minutes, or taking long lunch breaks was frowned upon. Time management, in general, is a key to success, as industry is driven by new products and regulated by project plans. Everyone has deliverables

and there is a deadline for any assigned task. I no longer had the luxury of investigating a problem until I was completely satisfied that I had found the best solution, or taking weeks to complete a scientific article. The ability to generate technical reports in hours, not in days, is critical for an industrial chemist.

Continuous education is essential to be successful in industry. I learned more during the first year of my industrial job than I did in the first couple of years in graduate school. The years in college give us a foundation, mostly for analytical skills. Success in one's career depends on continuous learning, whether it deals with analytical, behavioral, or management techniques. In conclusion, industry is a fun work place for people who like speed, challenges, and teamwork.

Posted by Samina



A key to success is remaining humble as a novice in your new role. Strive to learn something from everyone you meet in your company. Taking the initiative to seek out pertinent information and training for your job function enables you to quickly become competent and excel in the workplace. This information can be found through a wide variety of resources: clerical staff, human resources, scientific colleagues, supervisors, and managers. As a Ph.D. organic chemist, I have learned a tremendous amount from my colleagues, regardless of degree or position, which has enabled my career success.

Don't be afraid to ask questions even if they reveal your weaknesses in a certain area. Entry-level candidates are chosen based more on their potential for future success than on demonstrated experience. It is always better to ask questions than to fail at an experiment because you lack the required knowledge. Remaining an expert learner will impress your co-workers, increase your professional network, and enable continued success throughout your career.

Posted by Chris



I'm Done! Now What?

I remember people asking me, "What are you going to do after graduation?" I would nervously answer that I was going to graduate school, but I wasn't really sure what I'd be doing after that. In today's world, where people are judged on what they have accomplished and what they have planned for the future, being asked, "What are you going to do next?" can be pretty scary. After teaching at a medium-sized university, working in industry, and now as an independent consultant, I still don't think I could tell you what I want to do with the rest of my life. And I'm okay with it.

Looking back on my career path, I did not choose the traditional route — but I wouldn't trade my experiences for anything. As you look toward your future plans, remember that opportunities are what you make of them. Don't be afraid to create your own path.

Posted by Emilio



Take Note: Note-taking Matters

One of the most important things I was taught in college, but didn't truly understand the importance of, was writing in my lab notebook. As an undergraduate I found the only consequence for a missing weight, yield, or observation was a few points deducted here and there. Of course there was the grade-saving lab exam that can make up for those silly little mishaps in the notebook. So what was the big deal? After all, I still got that A or B.

Fast-forward a few years to graduate school when, all of a sudden, I was required to repeat an experiment. After staring at a notebook page with missing mole ratios, temperatures, and purification techniques, I realized I was in deep trouble. I had to start over "from scratch" and figure it out all over again. And by the way, what happened to that grade-saving lab exam? Well, it's called a dissertation — and it comes 4-6 years later, and is based solely on the contents of your lab notebook. So my advice that will carry you from graduate school to your post-doctoral position to your first job is: write with care and accuracy in your laboratory notebook. It's your most important scientific communication ever.

Posted by Angela



One Tough Balancing Act!

One skill I wish I had mastered long ago is achieving balance across my professional and personal life. Throughout your career there will be multiple demands, deadlines, and priorities that need to be delicately balanced. As a graduate student, there are courses, teaching assignments, graduate program oral and written exams, manuscript writing, service projects, professional meetings, and mentoring, in addition to your own research. If you join the professoriate, this expands to encompass proposal writing, significantly more teaching and mentoring, managing grants, more meetings, multiple and simultaneous research projects, on top of expectations for service and collegiality.

But, don't rest there! We all have personal lives that require our time and energy too. What's a budding professional to do?

Learn early in your career to balance multiple priorities and wisely discern which is most important at a given time. Some tasks will cause severe consequences or utter humiliation if not completed or completed on time. Others have to be done exactly right, while some things just need to get done. In what things can you ask for help or do less? Sometimes personal sacrifices are made for an important professional priority, and vice versa. Learning to say "no" to some things will allow you to say "yes" to others. These decisions are personal, situational, and critical for keeping your sanity in the midst of everything.

I am still working to master this skill. However, I am convinced that learning to achieve balance early in your career can lead to a more successful, healthier, and happier future!

Posted by Gloria

JONATHAN SEXTON, PH.D. is an assistant research professor and imaging core facility manager at the Biomanufacturing Research Institute and Technology Enterprise at North Carolina Central University, Durham.

SAMINA AZAD, PH.D. is a senior scientist at STERIS Corporation in Mentor, OH.

CHRISTOPHER J. CIOLLI, PH.D. is a scientist in process chemistry at Ricerca Biosciences, LLC, in Concord, OH.

EMILIO XAVIER ESPOSITO, PH.D. is an independent consultant in East Lansing, MI.

ANGELA WINSTEAD, PH.D. is an assistant professor at Morgan State University in Baltimore, MD.

GLORIA THOMAS MAGEE, PH.D. is an assistant professor at Xavier University of New Orleans, LA.



PHOTO COURTESY OF RYAN BICZO

TCNJ senior Ryan Bizco pursued a summer research project at TCNJ during the summer of his junior year.

There's No Better Teacher than Experience

BY LORI BETSOCK

RYAN BICZO SPENT HIS summer conducting undergraduate research at The College of New Jersey (TCNJ). His research verified electronic paramagnetic resonance as a valid method of measuring the distance between a metal center and a radical in a biological macromolecule.

Meanwhile, across the Atlantic, Pratik Talati participated in an International Research Experience for Undergraduates (IREU) program at Max Planck Institute for Psychiatry in Munich, Germany. There, he learned how to do an *in situ* hybridization and run a radioimmunoassay while analyzing a novel, stress-inducible transcript in neonatal mice.

The benefits of participating in undergraduate research can be as diverse and far-flung as these two examples. But no matter where your research takes you, you will generally use state-of-the-art instrumentation and materials that are typically much more sophisticated than you'd find in undergraduate laboratory courses. And more than likely, you will attend seminars and work with mentors to learn new techniques that will be applicable when pursuing graduate studies, medical school, or your first job. Gaurav Gaonkar, a second-year undergraduate student at the Illinois Institute of Technology, explains, "Gaining experience in a real-world application gives you

a better understanding of your field of study. It can also help you decide whether or not the track you are following is something you want to be doing."

Undergraduate research experiences also help you develop a network of professional contacts. You may even get published, or present your work at an ACS national meeting. These experiences can



PHOTO COURTESY OF PRATIK TALATI

Pratik Talati, a junior at the University of Alabama, participated in an IREU program at Max Planck Institute for Psychiatry in Munich, Germany.

help you develop the 'soft skills' necessary in today's workplace: cooperation, teamwork, and an ability to interact in a diverse workforce. What's more, you'll probably gain self-confidence from learning to overcome everyday challenges of scientific research. Bizco, for example, had to learn to use molecular modeling software, while Talati had to figure out a way to section neonatal mice brains for his research.

Establish a plan

Begin planning your research experience as soon as possible; in fact, your freshman year is not too soon. Start by talking with your professors and visiting your career center to develop a search strategy.

Gaonkar, for example, observes, "It's never too early to start researching. Start going for opportunities as soon as you can." During the summers of his junior and senior years in high school, Gaonkar conducted research at Kraft Foods, working with enzymes to modify whey proteins. Currently, he is conducting medical

research at Rush University Medical Center and will spend his summers as a volunteer medical researcher at Johns Hopkins University.

Take the first step

Your school's chemistry department website is the best place to begin your search for an undergraduate research experience. Begin by learning about each professor's research areas and projects. If you find something that really excites or fascinates you, talk to the professor and to other students who are already working on the project. Bizco, for example, first learned about research opportunities at TCNJ when he attended optional seminars and found one professor's research especially interesting. He explains, "I approached the professor to talk one-on-one about his research, and expressed my interest [in participating in the research]. I wanted to work on this particular project because I knew I would be using new instrumentation, and I enjoy learning new things. I was very interested in the computational aspect."

Choose projects that are well-funded. Unfunded or underfunded efforts may not have enough resources to sufficiently carry the project to completion, or could be signs that the work is not important enough to warrant funding. Find out how much research has been published about the project within the last two or three years. When prior work has been published, this probably means the research is considered worthwhile by the scientific community.

Are You Ready?

BEFORE TRYING TO SELECT A RESEARCH PROJECT TO PURSUE, start by asking yourself some tough questions. Do you have an interest in the project and the work you would be doing? Do you think you would be happy working under the professor and with the graduate and undergraduate students involved with the project? Think carefully about whether or not you have the time in your schedule to devote to a research project. Generally, for every credit hour, you'll probably spend three to four hours working in the lab. At a minimum, that will mean working eight to ten hours per week. Ask yourself if you are really willing to put forth the effort that will be required for the project. If your schedule is too full during the school year, there are a lot of summer research and internship opportunities available.

Psst — here's where to find leads!

If you don't find a project from your institution that interests you, check out the *ACS Directory of Experiential Programs in Chemistry* at www.acs.org/epic to find opportunities at other universities, government laboratories, or in industry.

The directory has a state-by-state listing of research experiences, internships, and co-ops in chemistry that are available to undergraduates. Each listing contains the name of the organization, the type of experience opportunities offered, and links to its main website and employment webpage (if available). The directory contains opportunities that are available during the academic year and during the summer.

Application deadlines and hiring processes vary among organizations. Some summer experiences are very competitive and can have deadlines that occur

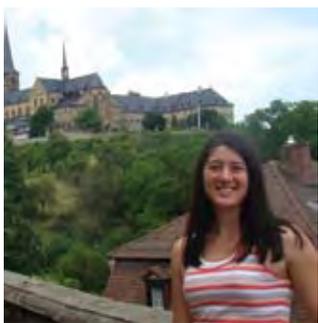
in the fall. Others will have deadlines that range from February to April. Check with the organization about the application procedures and deadlines.

Consider research abroad

Amanda Vandermark, now a senior at St. John Fisher College in Rochester, NY, participated in an REU at William and Mary College in Williamsburg, VA the summer following her sophomore year. This past summer, she took part in an IREU program at Universität Bayreuth in Germany. She valued both experiences, and notes that although they were very different programs, they actually built on one another.

According to Vandermark, "In an REU in the U.S., usually you're working in a lab with a group of about 10 other students. You'll be working as one group on independent projects.

You already have a set group of people who are in the same situation as you, and with whom you can easily become friends. With an IREU, you really have to put yourself out there to make friends — which, with the language barrier, can be tough at times. You may be the only undergraduate from the program work-



Amanda Vandermark, a senior at St. John Fisher College in Rochester, NY, participated in an REU at William and Mary College.

PHOTO COURTESY OF AMANDA VANDERMARK



Cherilyn Pasco, a senior at the University of Michigan, spent 10 weeks in an IREU program in Scotland.

PHOTO COURTESY OF CHERILYN PASCO

ing in the lab. Your colleagues might not have the time to socialize with you outside the lab."

The benefits of participating in the IREU experience extend beyond research. Cherilyn Pasco describes her experience as the opportunity of a lifetime. "You learn and create cutting-edge research while being immersed in another culture. I learned what surface-enhanced resonance Raman scattering was for the first time and made my first silver nanoparticles, but I also went Scottish *ceilidh* dancing, saw my first Highland coo, and searched for Nessie, the Loch Ness monster. It changed my life as much as it changed my approach to cultures and to science. I'd do it again in an instant, and I cannot wait to go back again. I am eager to go to graduate school and become an international researcher."

For more information about experiential programs in chemistry, go to www.acs.org/saprogram and click on Internships under "Related Links." 



LORI BETSOCK is an associate editor of *in Chemistry* magazine.

Here's the Latest Buzz

on the 237th ACS National Meeting

SALT LAKE CITY, UTAH
MARCH 22-26, 2009

Undergraduate Program



SUNDAY, MARCH 22

Undergraduate Hospitality Center

8:00 A.M. – 5:00 P.M.

Making the Most of Your First ACS National Meeting

8:00 – 8:45 A.M.

Career Options in Chemistry

9:00 – 10:30 A.M.

Graduate School Reality Check

9:00 – 10:30 A.M.

Networking Social with Graduate School Recruiters

10:30 A.M. – NOON

Chem Demo Exchange

10:30 A.M. – NOON

Community Outreach Workshop

1:00 – 2:00 P.M.

*Co-sponsored by the ACS Committee
on Community Activities*

Art Conservation and Archeological Research Symposium

2:00 – 3:30 P.M.

Kids and Chemistry Workshop

3:30 – 5:00 P.M.

Student Affiliates Chapter Awards Ceremony

7:00 – 8:30 P.M.

Undergraduate Social

8:30 – 11:30 P.M.

MONDAY, MARCH 23

Undergraduate Hospitality Center

8:00 A.M. – 5:00 P.M.

Graduate School Recruiting Breakfast

8:00 – 10:00 A.M.

Advances in Nanotechnology Symposium

9:30 – 11:00 A.M.

Chemistry Survival Guide: Learning How to Learn Chemistry

9:30 – 11:00 A.M.

Undergraduate Research Poster Session

12:00 – 3:00 P.M.

Sponsored by the ACS Division of Chemical Education and Co-sponsored by the ACS Divisions of Analytical Chemistry, Biochemistry, Environmental Chemistry, Inorganic Chemistry, Medicinal Chemistry, Nanotechnology, Polymer Chemistry, and Polymeric Materials: Science & Engineering.

Eminent Scientist Lecture featuring Luis Echegoyen

3:30 – 4:30 P.M.

Chemical Industry Networking Roundtable

Co-sponsored by the ACS Committee on Corporation Associates.

4:30 – 6:00 P.M.

Sci-Mix/Successful Student Affiliates Chapter Poster Session

8:00 – 10:00 P.M.

Program format and times are subject to change. Please consult the final program.

All events are sponsored or co-sponsored by the Society Committee on Education Task Force on Undergraduate Programming. Chair: Charles Baldwin, Union University, Jackson, TN. Program Chair: John Kaup, Clemson University, SC.

Follow the Swarm to the Graduate School Recruiting Events in Salt Lake

It's a great opportunity to network with graduate students and recruiters from prestigious graduate programs and learn about the in's and out's of graduate school.

Recruiting events kick off on Sunday, March 22, with the Graduate School Reality Check from 9:00 – 10:30 a.m.,

immediately followed by the Networking Social with Graduate School Recruiters from 10:30 a.m. – noon.

Recruiting events culminate with the Graduate School Recruiting Breakfast from 8:00 – 10:00 a.m. on Monday morning.

Buzz on over and enjoy the free food and opportunities to network.

Attention: Graduate School Recruiters

Attract students to your graduate school programs by participating in these events.

Please contact Lori Betsock at l_betsock@acs.org
Registration materials are also available online at www.acs.org/saprogram





PHOTOS COURTESY OF ST. JOHN'S UNIVERSITY

Student Affiliates Reaching Out

BY JENNIFER CHABRA AND WEICI FANG

THE 40TH ANNUAL ACS Middle Atlantic Regional Meeting (MARM) was held this year from May 17-21 at Queensborough Community College. Long before the actual meeting, the St. John's University Student Affiliates Chapter was active in planning the student events.

Some time before, we had heard about the ACS grant program for chapters planning undergraduate programs at regional meetings. After working up a plan with all the professors involved, we worked out a budget and submitted a proposal. A short while later, we learned that we would receive the grant!

Building on tradition

A key part of our plan was to coordinate activities with the Undergraduate Research Symposium held each spring by the ACS New York section. This symposium, scheduled for the opening day of MARM and held on the campus of Queensborough Community College, made it easy to piggyback MARM undergraduate programming. The fact that Alison Hyslop, co-organizer of the Undergraduate Research Symposium, is a professor at St. John's University, made it even easier to coordinate.

One of our goals was to encourage undergraduate students across the region to become involved in the Student Affiliates program. In the New York metropolitan area there are many colleges and universities with chemistry programs, but few with active Student Affiliates chapters. Our group made a collective effort to reach out to these schools.

Sharing advantages

In order to inform other students and professors about the advantages of a becoming a Student Affiliate and joining a chapter, we included two workshops in the undergraduate program. The first, "Making the Most of Being a Student Affiliate," was geared toward current SAACS members who wanted to learn more about the benefits of membership, and also toward non-members who were considering whether or not to join a chapter.



The workshop, led by Jodi Wesemann, ACS assistant director of higher education, and Jennifer Chabra, treasurer of the SAACS at St. John's University, included a question-and-answer session regarding SA chapters, and also personal experiences as told by current Student Affiliates. In addition, the workshop featured an interactive discussion between Student Affiliates from Hofstra and St. John's Universities, and Long Island University-C.W. Post, with students as well as professors in the audience. Among the membership benefits discussed were reduced fees for ACS meeting registration, journals, and resources, a broadened professional network, and opportunities to explore academic and industrial career choices and gain research insights. The audience not only heard from active Student Affiliates, but also from professors who are faculty advisors to ACS chapters in different

universities, including Justyna Widera and Ronald D'Amelia (from Adelphi and Hofstra Universities, respectively).

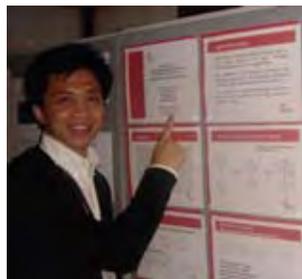
Building chapters

During the first workshop, many attendees asked questions relating to the "nuts and bolts" of starting a chapter at their respective colleges,



which served as a perfect prelude. The second workshop, which took place the following day, was called "Tapping into the Excitement: Strategies for Building – or Rebuilding – a Student

Affiliates Chapter." During this workshop, students and faculty from colleges and universities with active Student Affiliates chapters helped guide those who didn't have chapters or whose chapters had become inactive. This workshop was designed to explore the steps involved in creating and sustaining a vibrant chapter, as new students join and leaders graduate.



The workshop used case studies to explore topics such as generating excitement to motivate membership, scheduling and conducting effective meetings, planning events both on and off campus, and documenting activities in an annual report. Many useful resources were provided at both sessions, and participants left energized with ideas to develop over the summer and implement in the coming school year.

Overcoming challenges

Organizing workshops is a very difficult task that takes a lot of work, and on the road to reaching our goal, we faced many challenges.

One major challenge was finding a way to get students out to a scientific meeting on a weekend. The Undergraduate Research Symposium was able to draw an audience for us on Saturday; however, in order to boost attendance at the Sunday morning meeting, we needed an additional draw.

We decided to raffle off an i-Pod classic (donated by our SAACS chapter) and a ChemDraw Program (donated by CambridgeSoft).

We also faced another challenge: our advisor, Neil Jespersen, was away around the time of the workshops. Luckily, he left us under the expert care of Alison Hyslop.

Utilizing our network

Since the ACS New York section is very close-knit, Jespersen introduced us to several professors at different universities. These professors informed us of students who were interested in participating in the workshops.

Now that we had students who wanted to share their experiences, we needed to figure out how to organize the meeting. Professor Jespersen had us join a conference call to speak with ACS' Jodi Wesemann, who helped us learn how to orga-

nize and lead the sessions, and also understand the concerns of other chapters, what students want to get out of being Student Affiliates, and how our chapter can help.

Working together: A success

The St. John's University ACS Student Affiliates chapter was very active in participating at the various events during the five-day meeting. Our group visited various presentations and seminars, members presented their own research, and we successfully reached out to other schools. Together, we achieved our goals!



Student Affiliates chapter at St. John's University during the 2007-2008 academic year, graduated with a B.S. and is currently pursuing her M.S.

Acknowledgments

The sessions could not have been possible without the help of many people. Our chapter would like to thank Jodi Wesemann for helping to lead the sessions. We also thank local Student Affiliates chapter faculty advisors Justyna Widera and Ronald D'Amelia, as well as Jill Rehmann from St. Joseph's College in Brooklyn. Last but not least, our chapter would like to thank our own Neil Jespersen and Alison Hyslop for helping us coordinate these events, and all the students who helped organize them. **IC**

JENNIFER CHABRA, treasurer of the ACS Student Affiliates chapter at St. John's University during the 2007-2008 academic year, graduated with a B.S. and is currently pursuing her M.S.

WEICI FANG, secretary of the ACS Student Affiliates chapter at St. John's University during the 2007-2008 academic year, graduated with a B.S. and is currently pursuing her M.S.

40th MARM Undergraduate Program

Saturday, May 17

56th NY-ACS Undergraduate Research Symposium

Workshop: Making the Most of Being a Student Affiliate

Sunday, May 18

Workshop: Tapping into the excitement: Strategies for Building – or Rebuilding – a Student Affiliates Chapter

Monday, May 19

Workshops: Career Management and Development

Résumé Preparation and Targeting the Job Market for Undergraduates

Interviewing Skills

Managing an Effective Job Search

Résumé Preparation for Experienced Chemists

Individual Résumé Reviews

Professional Analytical Chemists in Industry: What Does an Analytical Chemist Do?

Delaware Valley Chromatography Forum 2008 Student Award

Tuesday, May 20

Panel Discussion: Traditional and Non-Traditional Careers in Chemistry

Women Chemists Committee Luncheon



Save the Dates!

2009 ACS Meetings

National

237th

Salt Lake City, UT
March 22-26, 2009

238th

Washington, DC
August 16-20, 2009

Regional

38th Great Lakes

Chicago, IL
May 13-16, 2009

65th Southwest

El Paso, TX
November 4-7, 2009

41st Central

Cleveland, OH
May 20-23, 2009

36th Northeast

Hartford, CT
October 7-10, 2009

64th Northwest

Tacoma, WA
June 28-July 1, 2009

44th Midwest

Iowa City, IA
October 21-24, 2009

61st Southeastern

San Juan, PR
October 21-24, 2009

All events are tentative. Please consult the final programs for any changes.

For more information, go to www.acs.org/meetings



NOBCChE

National Meeting 2009



**April 13 - 18, 2009
St. Louis, Missouri**

The **National Organization for the Advancement of Black Chemists and Chemical Engineers** is committed to the discovery, transmittal, and application of knowledge in the fields of science and engineering. The mission of **NOBCChE** is to build an eminent community of scientists and engineers by increasing the number of minorities in these fields.

Highlights of NOBCChE National Meeting include:

- An engrossing program of technical and scientific presentations
- Electrifying speakers
- Career Fair
- Thrilling science fair and science bowl competitions
- Annual Awards Banquet



TEXAS A&M UNIVERSITY

Graduate Studies in Chemistry

Jumpstart your career with a Ph.D. in chemistry from Texas A&M University. The Department of Chemistry at Texas A&M is one of the largest programs in the U.S., with 45 research groups spanning all areas of chemistry. Come create the science and technology of tomorrow, today!

*Applications for Fall 2009 due by February 2, 2009. No application fee!**



*Waived for domestic students only



Research Experiences for Undergraduates (REU)

Not a senior? Explore summer research in our 10-week National Science Foundation-REU program! May 26 - July 31, 2009

Applications due February 16, 2009

Apply online today.

www.chem.tamu.edu

If your school would like to include a notice in an upcoming issue of *in Chemistry*, contact Lori Betsock, (800) 227-5558, ext. 6188 or e-mail l_betsock@acs.org.

THE GEORGE WASHINGTON UNIVERSITY WASHINGTON DC



Department of Chemistry

Analytical Materials
Inorganic Organic
Environmental & Combustion
Physical

Our location in the heart of D.C. allows us to collaborate with federal laboratories (NRL, NIST, NIH, FDA, USGS, EPA, & the FBI), giving unique access to instrumentation, research and post-graduate employment opportunities

For More Information:

email: gwchem@gwu.edu phone: 202-994-6121
<http://www.gwu.edu/~gwchem> fax: 202-994-5873

NOW AVAILABLE ONLINE AND IN HARDCOVER!



Directory
of Graduate
Research
2007



ACS Directory of Graduate Research 2007 AND Searchable Online Version: DGRweb 2007

- > Facilitates Research Collaborations in Chemical Sciences
- > Enables Networking Across Chemical Subdisciplines
- > Helps Students with Selecting a Graduate Program

DGR and **DGRweb 2007** provide the most comprehensive information about graduate research and researchers in the U.S. and Canada!

Go to www.acs.org/dgrweb to conduct free online searches

FIND INFORMATION ON:

668 academic departments
10,118 faculty members
68,243 publication citations

SEARCH EIGHT AVAILABLE DISCIPLINES:

- > Chemistry
- > Chemical Engineering
- > Biochemistry
- > Medicinal/Pharmaceutical Chemistry
- > Polymers and Materials Science
- > Toxicology
- > Marine Science
- > Environmental Science

Get your print copy of DGR 2007 today!

Item **39757**, US **\$95** each

(additional shipping and tax charges may apply).

Online: www.acs.org/dgrweb then use the sidebar link to purchase a print copy

By phone: using a credit card (MasterCard, Visa or American Express), call **1-800-227-5558** or **1-202-872-4600**

By fax: send your order to **1-202-872-6067**
(please include credit card account number, expiration date, name on the card, and authorizing signature)



A Genetically Advanced M.S. in Forensic Science

Our Professional Science Master's Degree focuses on DNA Analysis

Towson University's M.S. in Forensic Science is an interdisciplinary graduate program combining chemistry, biology, and math to provide you with advanced scientific and laboratory training in forensic science. The program emphasizes a molecular biology-based approach with a focus on forensic DNA analysis. Students gain extensive laboratory experience and have the option of completing a research project and thesis, or an internship in a forensic science laboratory.

Gain advanced knowledge and laboratory experience in:

- Crime scene investigation
- Physical evidence analysis
- Instrumental methods
- Microscopy and materials analysis

The program is consistent with the standards established by the American Academy of Forensic Sciences Forensic Science Education Programs Accreditation Committee.



For more information and to apply, visit grad.towson.edu/frscm/mg or call the Graduate School at 410-704-2501.



Express Yourself with ACS Bumper Stickers!



Everyone has Avogadro's number



Heisenberg may have slept here



Experiment with a chemist



Chemists have solutions



Honk if you passed p-chem

Order Now!

Any combination of 10-49 bumper stickers.....\$1.20 each + S&H
Any combination of 50-99 bumper stickers.....\$.90 each + S&H
Any combination of 100-499 bumper stickers.....\$.70 each + S&H
Any combination of 500 or more bumper stickers....\$.65 each + S&H

For more information, call Robin Lindsey at (800) 227-5558, ext. 4480



..... choose an unconventional career!!

**Nanoscale Physics
Subsurface Geoscience
Environmental Analysis & Decision Making**

www.profms.rice.edu

**A program offering cutting edge science education,
management skills, and practical experience
answering the demand for science-educated
professionals with business and communication
skills**

**COME TO HOUSTON,
AMERICA'S MOST LIVEABLE AND
AFFORDABLE CITY!**

A bold hybrid of science and business.

The Master of Bioscience (MBS) program at KGI offers the interdisciplinary curriculum, industry insight, and unparalleled connections you need to excel in the life sciences industry: medical devices and diagnostics, pharmaceutical discovery and development, bioprocessing, business of bioscience, and clinical and regulatory affairs.

Susan Lin, MBS
R&D Project Manager Associate
Codexis, Inc.

Apply to the MBS
program today—KGI.edu



KECK GRADUATE INSTITUTE
of Applied Life Sciences

*Keck Graduate Institute is a member
of the prestigious Claremont University
Consortium in Claremont, California.
(909) 607-8500*





2009 ACS Directory of Experience Opportunities

*Your online source for
undergraduate internship,
co-op, and summer work
experiences...*

Now available at
www.acs.org/epic



Experiential Opportunities Help You to:

- Establish and fine tune your professional skills.
- Build your résumé with relevant work experience.
- Establish a professional network.
- Acquire skills and insights not available in a classroom setting.

Graduate Study in Chemistry

It's your
FUTURE



The Graduate Program in Chemistry at the University of Tennessee provides research and studies in the traditional areas of inorganic, analytical, organic and physical chemistry as well as polymer and materials chemistry, neutron science, and many emerging interdisciplinary areas.

Close ties with Oak Ridge National Laboratory and the new Spallation Neutron Source (about 20 minutes from campus) allow unique access to state-of-the-art technologies and gives our students unmatched opportunities for research, fellowships, and post-graduate employment at federal facilities.

For more information:

studychemistry@utk.edu www.chem.utk.edu Phone: (865) 974-6976

If your school would like to include a notice in an upcoming issue of *in Chemistry*, contact Lori Betsock, (800) 227-5558, ext. 6188 or e-mail l_betsock@acs.org.

University of Central Florida Department of Chemistry

UCF is located in Orlando, FL, close to the Kennedy Space Center and major research parks. UCF, the 6th largest university in the US, has over 48,000 students and outstanding research facilities. Competitive stipends and fellowships are available for PhD students.

Doctoral Research In

- Materials Chemistry
- Environmental Chemistry
- Forensic Science
- Biochemistry
- Nanoscience
- Photonics



Department of Chemistry
P.O. Box 162366, Orlando, FL 32816-2366
(407) 823-2246
e-mail: chemgrad@mail.ucf.edu
<http://www.cos.ucf.edu/chemistry/>

We are Marshall...we are your future.

MARSHALL UNIVERSITY FORENSIC GRADUATE PROGRAM EDUCATING FUTURE FORENSIC SCIENTISTS

FEPAC Accredited



Marshall University's Master of Science in Forensic Science Program is a nationally-recognized leader in forensic science education. Our students receive instruction using state-of-the-art equipment and facilities, preparing them for a future in a modern forensic science laboratory.

In addition to a broad-based core curriculum, an area of emphasis in Forensic Chemistry is offered that focuses on toxicology, drug analysis, explosives/arson and trace evidence. Students may also pursue more than one specialty area including Forensic DNA Analysis, Crime Scene Investigation and Computer Forensics. Uniquely, the Marshall University Forensic Science Center is home to the MS Forensic Science Program as well as its forensic DNA laboratory accredited by FQS-I as an ISO 17025 testing lab for CODIS testing and forensic casework, and AABB for parentage testing.

Marshall graduates are employed by a variety of local, state, as well as federal agencies such as the FBI, Secret Service, State Department, ATF, DEA, the Armed Forces DNA Identification Laboratory, insurance agencies, private reference labs, crime scene units and more than three dozen state and local bureaus of investigation.

We currently offer in-state tuition and special fee reductions to residents of Delaware, Georgia, Kentucky, Louisiana, North Carolina, South Carolina and Texas. *Inquire about stipends and tuition waivers.*

Marshall University Forensic Science Center • Huntington, WV

Phone: 304.690.4363 x 202 Fax: 304.690.4371

Email: forensics@marshall.edu • <http://forensics.marshall.edu>

INTERNSHIPS • STATE-OF-THE-ART-FACILITIES • HIGH-TECH EQUIPMENT • JOBS





American Chemical Society
1155 Sixteenth Street, NW
Washington, DC 20036

NON-PROFIT ORG.
U.S. POSTAGE
PAID
Washington, DC
PERMIT NO. 4119