

# The Graduate School Experience: What to expect

## Our panelists:

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# The Graduate School Experience: What to expect

slides will be available online:  
<http://www.acs.org/undergrad>

Attending an ACS Meeting →  
Spring 2018 Meeting Highlights



## What to expect...

- How is graduate school different than undergrad?
- What should I do before I go there?
- What happens when I get there?
- How do I choose a research advisor?
- What kinds of experiences will I have? What kind of experiences should I have?
- What does it take to succeed in graduate school?

# The Grad School Journey

**it's going to be like a reality TV show**

- lots of young people from all over the world converging on a single chemistry department
- many will live together
- competing in a game of wit, skill, and tenacity
- there will be tears, laughter, sadness, and swearing
- typically, the most stubborn “contestants” win

# The Biggest Differences

- **undergraduate**
  - you play the “credit game”
  - you have courses and grades as motivators
- **graduate school (M.S. and Ph.D.)**
  - it’s a very individual process - no student takes the exact same journey as another student
  - at times, *you* are your only motivator
  - your intellectual progress is monitored by a committee; the “course game” is over

# Pause for panel thoughts

**What are some other key differences between undergraduate and graduate studies?**

**What surprised you most when you started graduate school?**

# Experiences to have before graduate school



- **relevant coursework**
- **practice with both written and oral communication skills**
- **gain comfort/proficiency with software**
  - word processing, spreadsheet, presentation
  - Origin or Igor Pro (data graphing software)
  - ChemDraw (chemical structure drawing software)
  - EndNote or Mendeley (citation tools)
- **gain skill with search engines like SciFinder, WebofScience, and PubMed**

# Planning for Graduate Work in Chemistry



A screenshot of a web browser displaying the ACS website. The browser's address bar shows the URL "https://www.acs.org/content/acs/en/education/students/graduate/gradschool.html". The website's navigation menu includes "ACS", "Publications", "C&amp;EN", "CAS", "MEETINGS", "CAREERS", "MEMBERSHIP &amp; NETWORKS", "EDUCATION", "ADVOCACY", "FUNDING &amp; AWARDS", "NEWS", and "ABOUT ACS". The main content area features a large banner with the text "PLANNING FOR GRADUATE WORK" and a photograph of three scientists in a lab. Below the banner, a yellow bar states "Developed by the ACS Committee on Professional Training". A navigation bar includes links for "Home", "Beginning the Process", "Prepare as an Undergraduate", "Choosing a Graduate Program", "Early Graduate Life", and "International Students". The main heading "Planning for Graduate Work in Chemistry" is displayed in a large, black font.

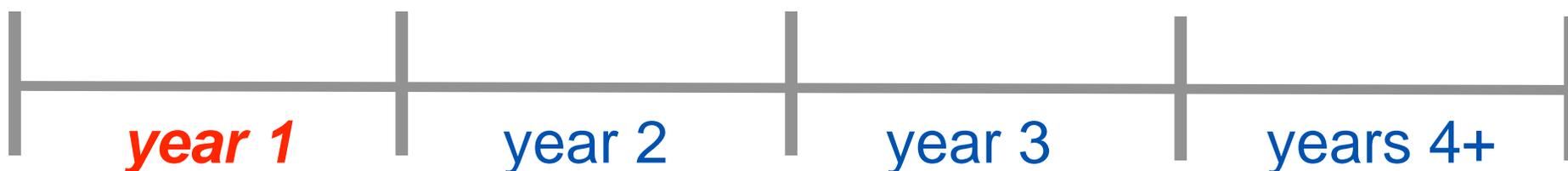
# Independent funding is not necessary.



- **typical graduate programs will guarantee support for the time frame of a typical degree**
  - usually in the form of teaching assistantships
- **having independent funding can be advantageous**
  - can devote more time to research early in your graduate career
  - may allow more options for potential mentors
- **external options**
  - NSF Graduate Research Fellowship Program (GRFP), NIH Predoctoral fellowships (F32)
  - ACS Graduate Education: *Grants Fellowships and Awards*
- **internal options**
  - NIH Training Grants, various fellowships

# The Grad School Journey

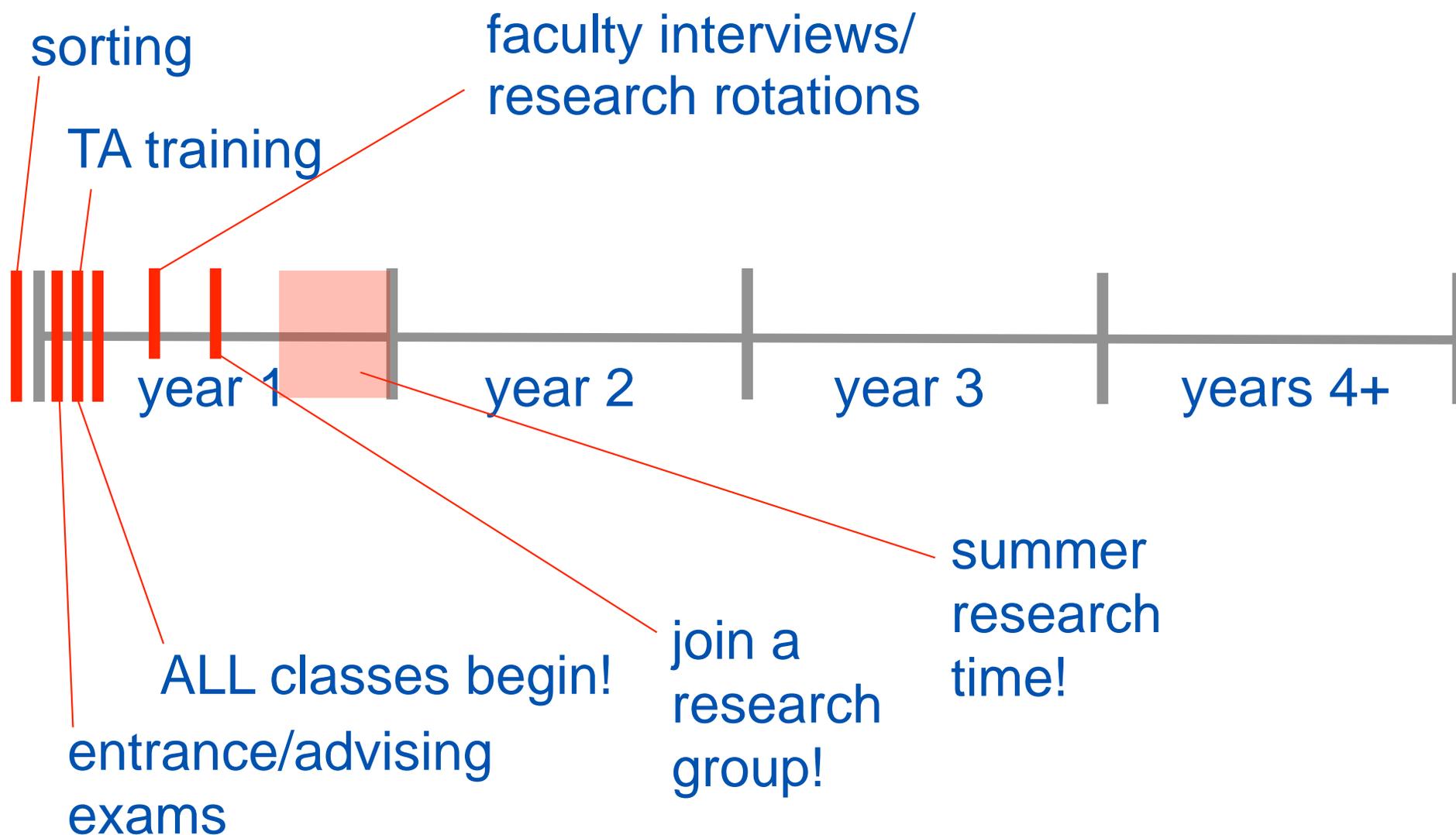
**indoctrination.** a whole lot of new will be coming at you from every direction. don't worry, everyone else feels exactly like you do



**a time for intense study and reflection.** rely on your strengths; recognize and confront your weaknesses

**learn to manage your time.** work hard *most* of the time; work smart *all* of the time

# The Grad School Journey



# A word about being a TA

## Graduate Students' Teaching Experiences Improve Their Methodological Research Skills

David F. Feldon,<sup>1\*</sup> James Peugh,<sup>2</sup> Briana E. Timmerman,<sup>3</sup> Michelle A. Maher,<sup>4,5</sup> Melissa Hurst,<sup>4</sup> Denise Strickland,<sup>4</sup> Joanna A. Gilmore,<sup>6</sup> Cindy Stiegelmeier<sup>7</sup>

Science, technology, engineering, and mathematics (STEM) graduate students are often encouraged to maximize their engagement with supervised research and minimize teaching obligations. However, the process of teaching students engaged in inquiry provides practice in the application of important research skills. Using a performance rubric, we compared the quality of methodological skills demonstrated in written research proposals for two groups of early career graduate students (those with both teaching and research responsibilities and those with only research responsibilities) at the beginning and end of an academic year. After statistically controlling for preexisting differences between groups, students who both taught and conducted research demonstrate significantly greater improvement in their abilities to generate testable hypotheses and design valid experiments. These results indicate that teaching experience can contribute substantially to the improvement of essential research skills.

Academic culture in doctoral research universities' STEM (science, technology, engineering, mathematics) programs typically values research activity over teaching (1, 2). Faculty commonly believe that research activities enhance teaching quality but disbelieve that teaching similarly enhances research skills (3, 4). These beliefs influence not only the professional priorities of STEM faculty, but also the guidance

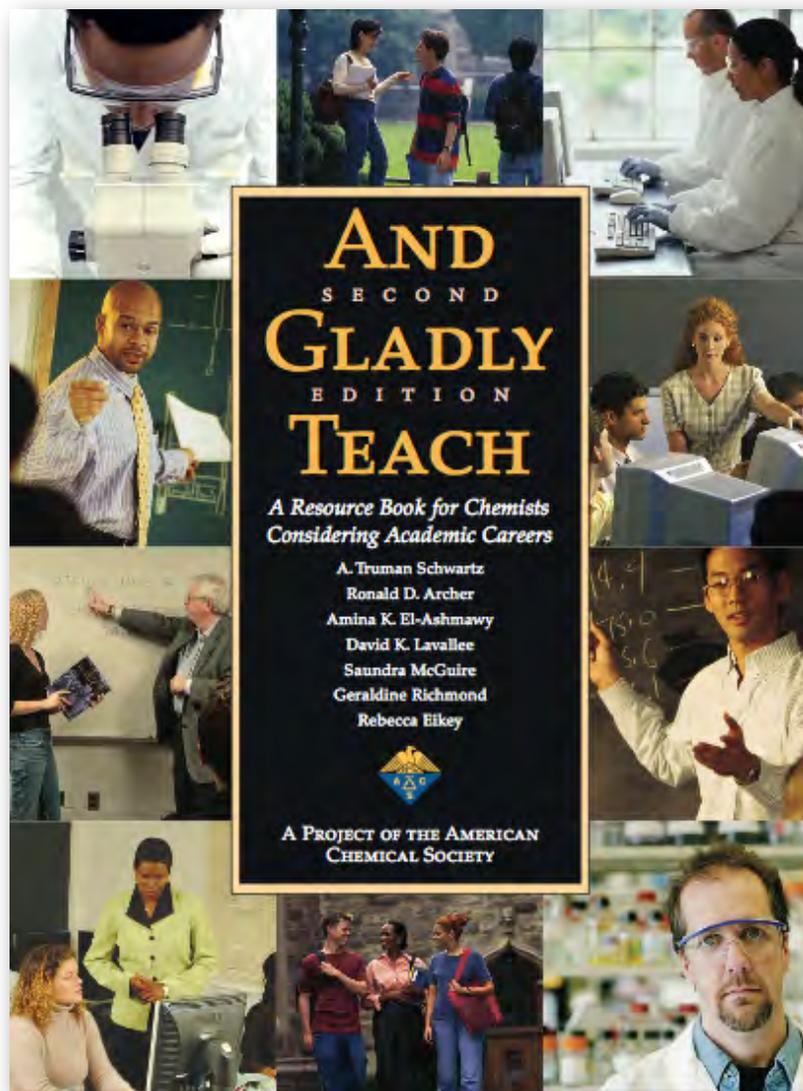
teaching in a context that requires students to effectively conceptualize research and solve problems through inquiry (for example, frame testable hypotheses, design valid experiments, or draw appropriate conclusions based on data), instructors must practice these skills themselves as they reason through these problems in order to provide appropriate guidance to their students. When students are trying to solve different problems,

(7). In contrast, a research assistantship in a laboratory probably provides fewer, relatively similar projects that are based on the research agenda of the lab or principal investigator. Further, many high-level research design issues are likely to be resolved without requiring the research assistant to make substantive contributions to, for example, specifying research questions or determining methodology. For graduate students new to a lab, it is likely that the funded grant proposal supporting their work was written and submitted before their arrival.

Additionally, when learners are required to articulate their reasoning processes substantial evidence indicates that they develop more elaborate and effective schemas for problem-solving that facilitate performance on both typical and new problems (8, 9). Therefore, when instructors explain their own research processes to guide their students (10) they are further reinforcing their own learning. Research assistantships do not necessarily require extensive self-explanation (11).

Several small, qualitative studies report benefits of teaching for graduate student participants' research development. One found that 21 of 27 teaching assistants leading undergraduate labs reported positive benefits to their research skills as a result of their teaching experiences (12). Another found that 33% of research advisors supervising participants in a National Science Foundation (NSF) GK-12 program (13) directly attributed improvements in participants' research

# And Gladly Teach



a brief yet  
comprehensive guide to  
preparing for and  
securing a faculty  
position at a college or  
university

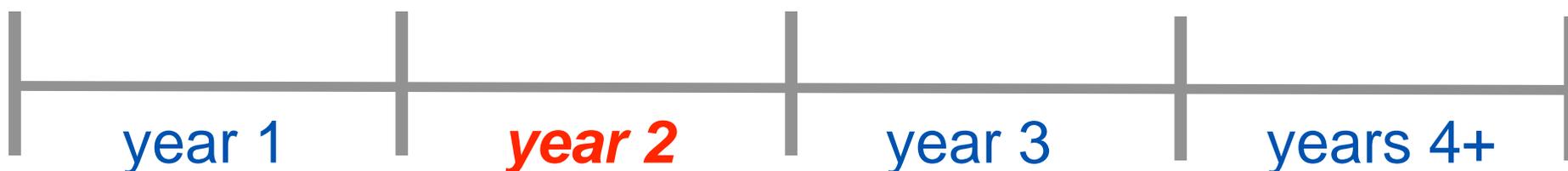
has some great  
information on being a  
teaching assistant!

# The Research Mentor

- a critical decision!
- don't decide on prestige alone (or at all)...
  - does your personality mesh with your mentor?
  - does your mentor's management style mesh with your work habits?
  - can you *learn* from your mentor?
  - does your mentor appreciate your goals and aspirations?
  - how does your mentor define “success”?

# The Grad School Journey

**you're not new anymore.** time to start becoming self-motivated and a little more independent!



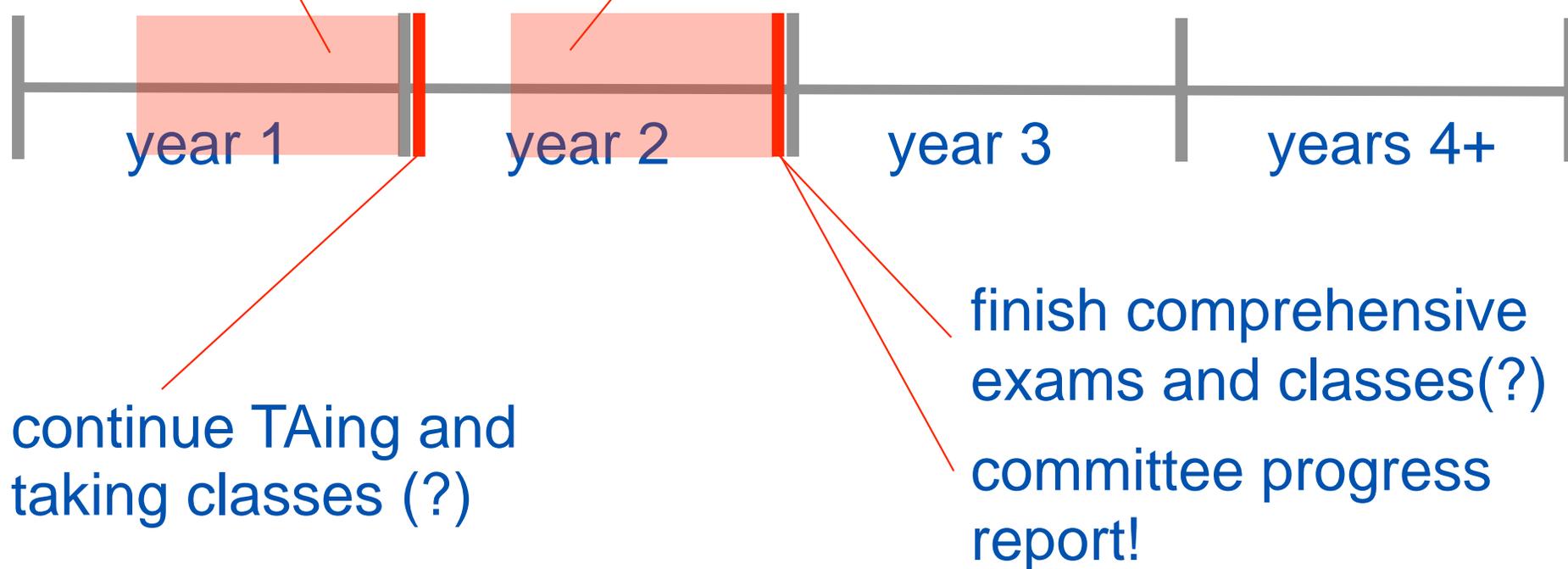
**transition your learning.** classes are almost done; time to learn for the sake of learning and discovery

**assess and reflect.** you should be progressing and growing. are you? are you overcoming weaknesses?

# The Grad School Journey

begin comprehensive exams

*start giving presentations:*  
group meetings, department functions, conferences



## the f-word



- You will fail in graduate school—I can practically guarantee it. But this doesn't have to be a bad thing.
- **Failure** teaches us that we have to change. It helps us develop problem-solving skills and familiarizes us with confrontation. It also helps us admit that we need mentoring.

# Pause for panel thoughts

**Can you recall times in your graduate career where a failure actually resulted in something good?**



### Graduate Students & Postdocs!

Events for YOU at the 255th ACS National Meeting

#### KEY

- Technical or Research-Based Symposium
- Social Event
- ◆ Career Exploration and Development
- \* Research Showcase, or Miscellaneous

Please consult the ACS 2018 Mobile App to confirm event locations and times.

**SUNDAY, MARCH 18, 2018**

#### BIOL: Graduate Student & Postdoctoral Fellow Symposium ● \*

8:30–11:50 AM

Location: Room 244, Ernest N. Morial Convention Center

#### CHED: Chemistry Education Research: Graduate Student Research Forum ● \*

8:30–11:55 AM

Location: Fleur De Lis, New Orleans Marriott Convention Center

#### PROF: LGBTQ+ Graduate Student & Postdoctoral Scholar Research Symposium ●

9:00 AM–11:00 AM, 1:30–4:50 PM, and Monday March 19, 3:00–5:00 PM

Location: Grand Salon D Sec 22, Hilton New Orleans Riverside  
Research and technical programming presented by graduate students and postdoc scholars. Includes panel discussion on the LGBTQ+ community in chemistry from 3:50–4:50 PM.

#### ChemIDP: Planning for your Career ◆

11:00 AM–12:45 PM

Location: Room 217, Ernest N. Morial Convention Center

Learn the first steps toward career planning and how ACS's career planning tool can help. The ChemIDP workshop will be held in conjunction with ACS Career Pathways workshops.

#### YCC: Starting a Successful Research Program at a PUI \* ◆

1:00–4:30 PM

Location: Grand Salon C Sec 18, Hilton New Orleans Riverside

#### Workshop: Networking 101 ◆

1:30–3:00 PM

Location: Room 356–357, Ernest N. Morial Convention Center

#### PRES: Science Cafes & Engaging the Public: Techniques for Hosting Successful Events ■ ◆

1:30–5:20 PM

Location: Grand Salon B Sec 9/12, Hilton New Orleans Riverside

#### Women Chemists of Color Networking Event ■ ◆

3:00–4:30 PM

Location: TBA

#### IAC & Education: Networking Globally ■ ◆

4:00–5:30 PM

Location: Windsor room, Hilton New Orleans Riverside

See ad on page 23 for more information

At ACS Meetings, there are events especially for graduate students and post-docs

# Gordon Research Conferences and Seminars



The screenshot shows a web browser displaying the Gordon Research Conferences website. The browser's address bar shows the URL <https://www.grc.org/grs.aspx>. The website features a dark blue header with the GRC logo and the text "Gordon Research Conferences" and "frontiers of science". Below the header, there is a navigation menu with buttons for "Home", "Conferences", "For Attendees", and "The GRC Organization". The "Conferences" menu is expanded, showing options like "Current Meetings (2016)", "Upcoming Meetings (2017)", "Past Meetings", "Gordon Research Seminars", "Conference Portfolio", and "Proposing a New Gordon Conference". The main content area is titled "Gordon Research Seminars" and features a sub-header "Gordon Research Seminars" in green. The text describes the GRS program as a series of highly successful and unique meetings for early-career scientists. It includes a section titled "For Students, by Students..." and "The Benefits of a GRS:" with a bulleted list of advantages. A "Page Menu" on the right lists links for "About", "Find a Meeting (2017)", "Find a Meeting (2016)", "How to Apply", "Testimonials", and "Frequently Asked Questions". A search bar is located at the bottom left of the main content area. An image in the bottom right corner shows several people in a laboratory setting, looking at a poster or document on a wall.

## Gordon Research Conferences

frontiers of science

### Gordon Research Seminars

Home

Conferences

- Current Meetings (2016)
- Upcoming Meetings (2017)
- Past Meetings
- Gordon Research Seminars**
- Conference Portfolio
- Proposing a New Gordon Conference

For Attendees

The GRC Organization

Search:  GO

### Gordon Research Seminars

**For Students, by Students...**

GRC provides many opportunities for early-career scientists to get involved at the *Frontiers of Science*, the most notable of which is the **Gordon Research Seminar (GRS)** program. Gordon Research Seminars are a series of highly successful and unique meetings that enable young researchers to share in the GRC experience. Each seminar is held in conjunction with a related GRC and begins the weekend immediately prior to the GRC. Graduate students, post-docs, and other scientists with comparable levels of experience and education come together in a highly-stimulating and non-intimidating environment to discuss their current research and build informal networks with their peers that may lead to a lifetime of collaboration and scientific achievement. These seminars are organized by young investigators with the support of leading scientists from the associated GRC. The majority, if not all, of the GRS participants are expected to participate in the following GRC.

**The Benefits of a GRS:**

- Network with your peers in an informal atmosphere
- Engage in scientific discussions at the forefront of your field
- Interact with leaders who may serve as mentors during your career
- Gain the confidence to participate in a Gordon Research Conference
  - apply to both the GRS & GRC

**Contribute to a GRS:**

- Submit an abstract - abstracts are used to select speakers
- Present a poster and get valuable feedback and suggestions

Page Menu

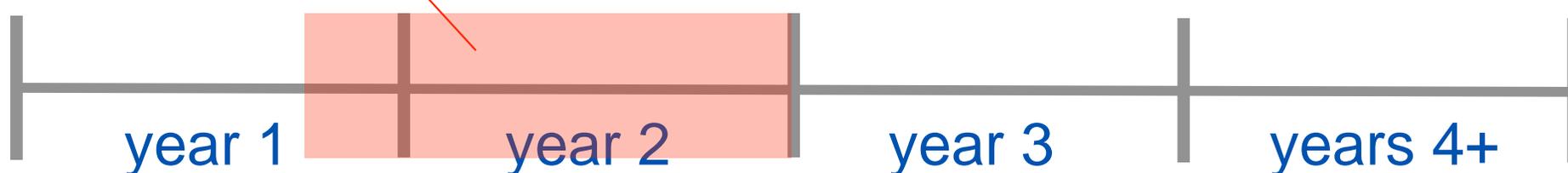
- About
- Find a Meeting (2017)
- Find a Meeting (2016)
- How to Apply
- Testimonials
- Frequently Asked Questions



# The Grad School Journey

## RESEARCH!

develop good habits...



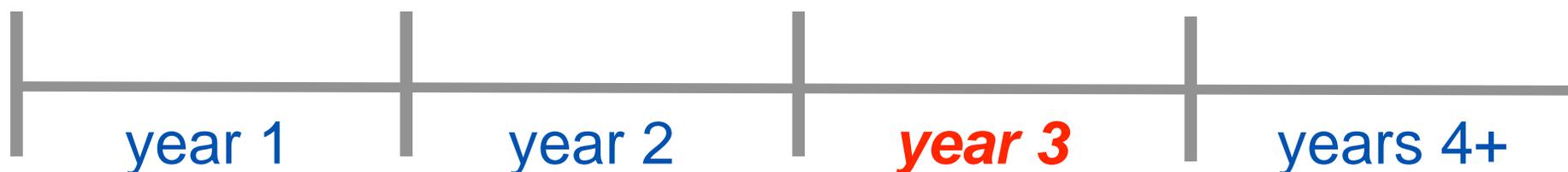
- keep your lab notebook detailed, up-to-date, and indexed
- write up each of your experiments as a full report (methods, results, and conclusions!)
- keep a literature notebook - one page summaries of any publication you read
- build a bibliography (using Endnote, Mendeley, etc.)

# Pause for panel thoughts

**What are other good habits to develop as a graduate student?**

# The Grad School Journey

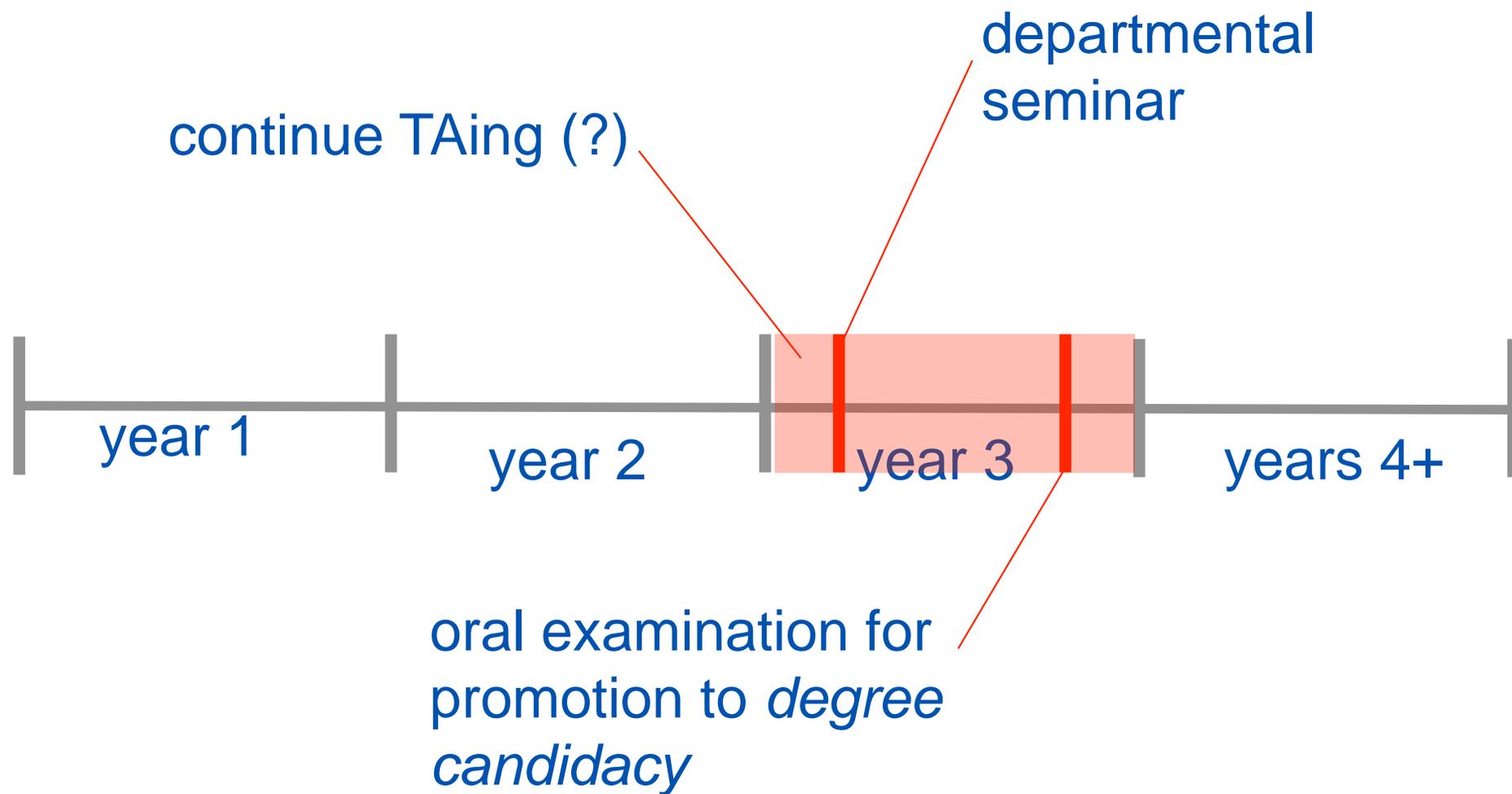
**a turning point.** time for your mentors to assess your progress and your strengths/weaknesses



**begin to take charge of your research.** come up with your own ideas and directions. become the expert!

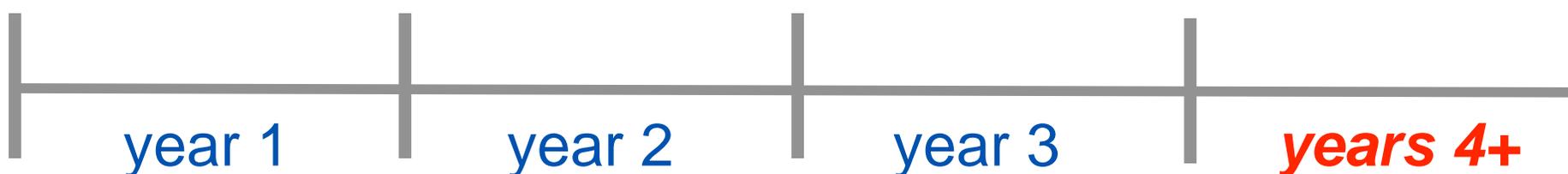
**push yourself.** the excitement has worn off... but you're not that close to being done

# The Grad School Journey



# The Grad School Journey

**own your research.** learn to communicate and promote your work: publishing, presenting talks and posters, write and defend your dissertation

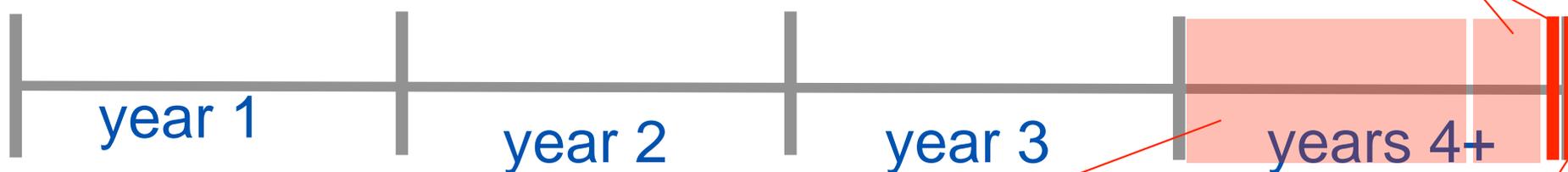


**you're the expert.** mentor a younger grad student or an undergrad

**prepare for life after graduate school.** engage in professional development activities to supplement your scientific training

# The Grad School Journey

write your dissertation!  
defend your dissertation!



**RESEARCH!**  
become the expert!  
become independent!  
gain the skills necessary to be  
successful in future pursuits

**GRADUATE!**

# The End!!



## ... or is it a beginning?

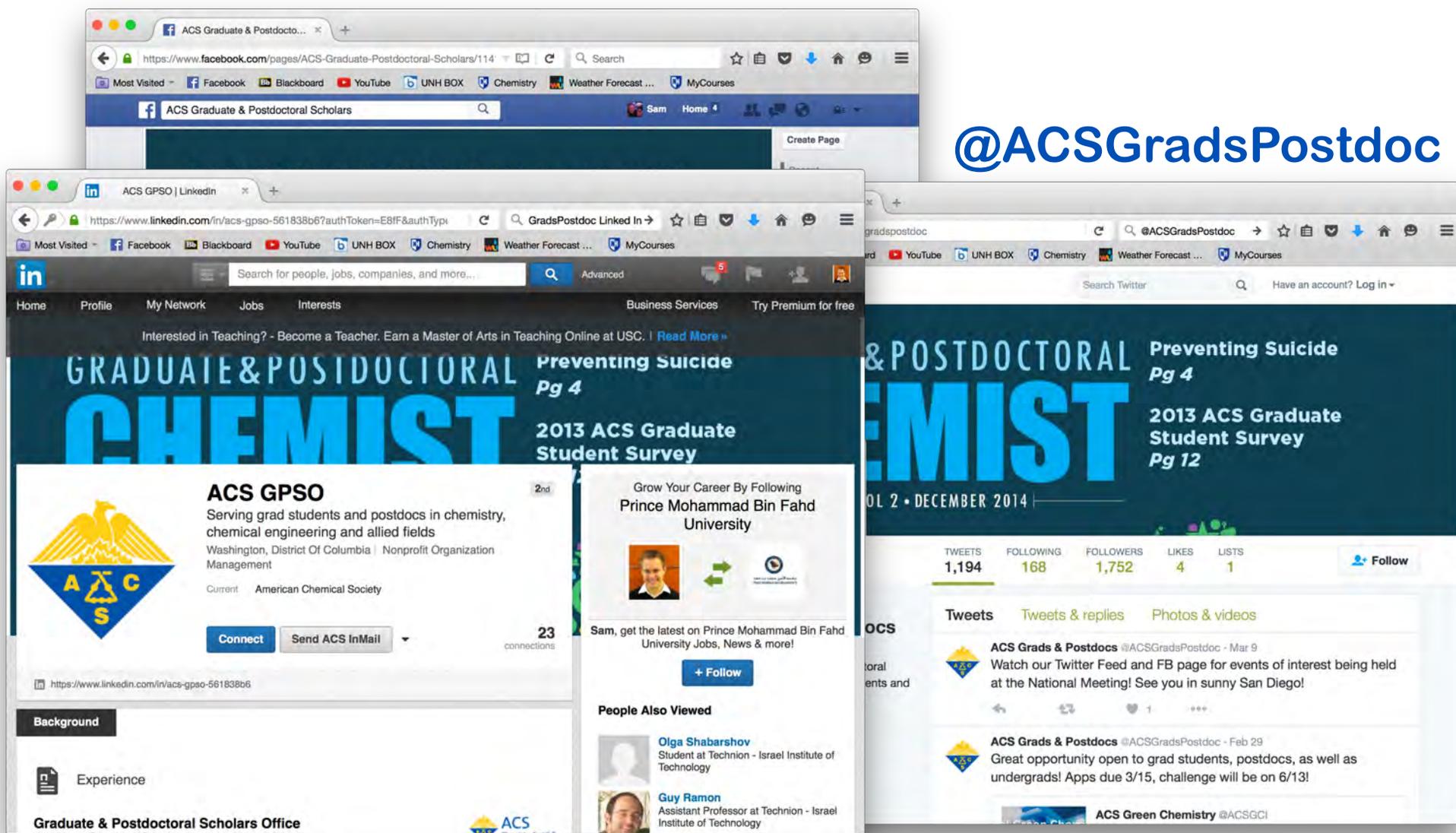
*prepare for what's  
next!*



- how can your mentor and institution help with this?
- get to know other members of the faculty (not just those on your committee)
- NETWORK at meetings/conferences and online!!
- **take advantage of what the ACS has to offer!**

# ACS Social Media Resources

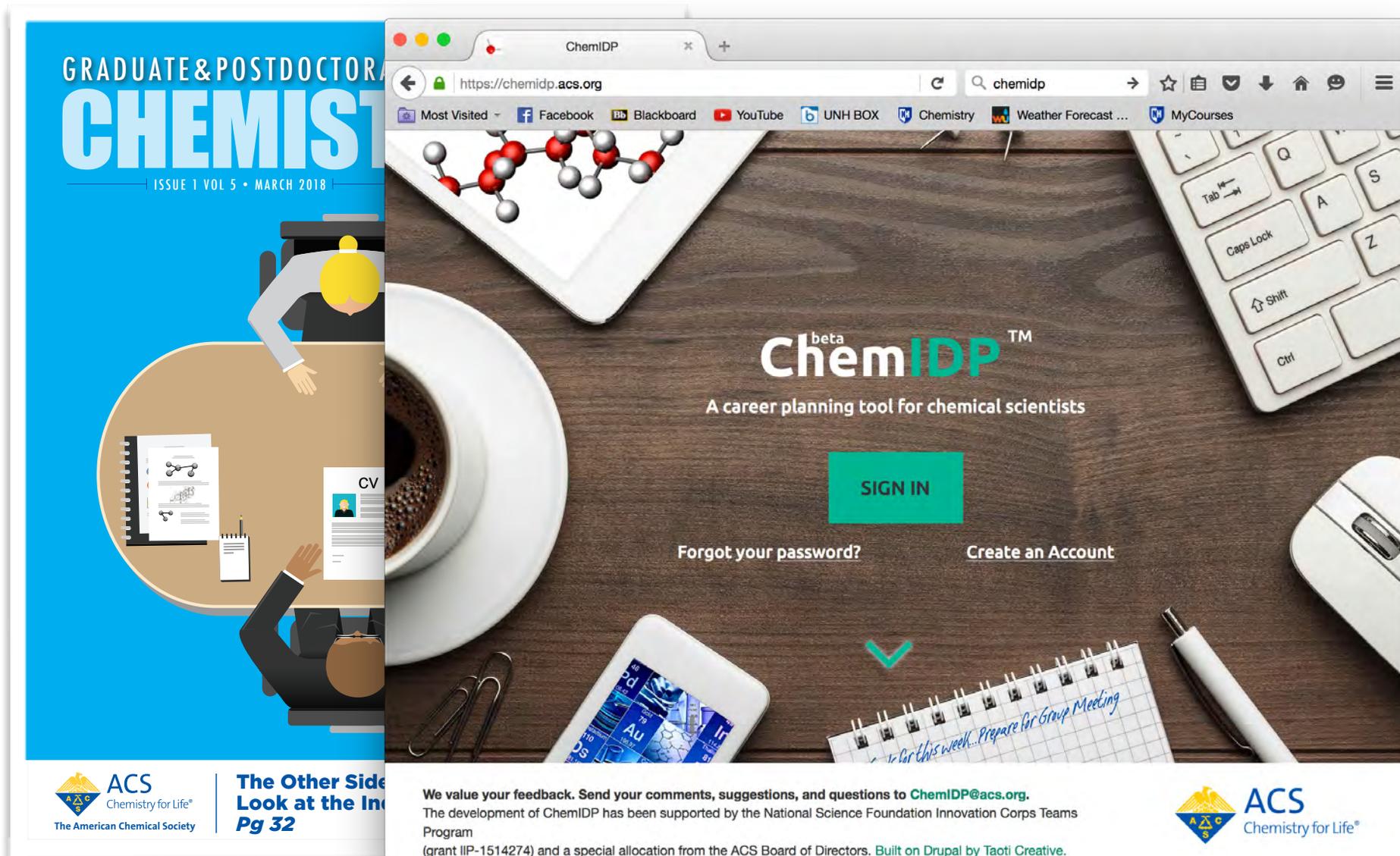
@ACSGradsPostdoc



The collage displays three social media resources:

- Facebook:** A screenshot of the ACS Graduate & Postdoctoral Scholars page, showing the navigation bar and search function.
- LinkedIn:** A screenshot of the ACS GPSO profile page. The profile includes the ACS logo, a description: "Serving grad students and postdocs in chemistry, chemical engineering and allied fields", and a "Connect" button. A featured article titled "GRADUATE & POSTDOCTORAL CHEMIST Preventing Suicide Pg 4" is visible.
- Twitter:** A screenshot of the @ACSGradsPostdoc Twitter profile. It shows 1,194 tweets, 168 following, and 1,752 followers. A recent tweet from March 9th reads: "Watch our Twitter Feed and FB page for events of interest being held at the National Meeting! See you in sunny San Diego!".

# ACS Resources for Grads



GRADUATE & POSTDOCTORAL  
**CHEMIST**  
ISSUE 1 VOL 5 • MARCH 2018

CV

**beta ChemIDP™**  
A career planning tool for chemical scientists

**SIGN IN**

[Forgot your password?](#)      [Create an Account](#)

*For this week... Prepare for Group Meeting*

**ACS** Chemistry for Life®  
The American Chemical Society

**The Other Side**  
**Look at the Inside**  
**Pg 32**

We value your feedback. Send your comments, suggestions, and questions to [ChemIDP@acs.org](mailto:ChemIDP@acs.org).  
The development of ChemIDP has been supported by the National Science Foundation Innovation Corps Teams Program (grant IIP-1514274) and a special allocation from the ACS Board of Directors. Built on Drupal by Taoti Creative.

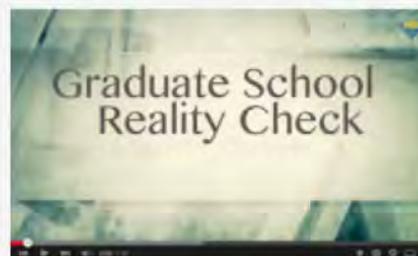
**ACS** Chemistry for Life®

### You're in—Now What?

- Making the Most of Graduate School Visit Weekends
- Surviving Your First Year of Graduate School
- Research Projects: A Matter of the Right Chemistry
- Navigating the Ups and Downs of Graduate School
- The Teaching Assistant's Guide to Success
- Mastering Graduate School Acrobatics
- Closing the Skills Gap: Biotech Jobs
- So, how about a PhD?, Part 4: How to Work Smart & Graduate Visits



### Graduate School Reality Check - Video Playlist



How do I prepare myself for graduate school? How do I choose schools and programs to apply to and how do I know which school is the right one for me? Join Professor Sam Pazicni from the Department of Chemistry at the University of New Hampshire, as he

answers these questions and much more considering how to decide what degree is best for you, but also advice on how to survive and succeed once you have gotten in to the graduate program of your dreams!

# Enjoying Success

- your graduate cohort will have entered as equals
  - the *tenacious* will fail, but not give up
  - the *reflective* will quickly recognize weaknesses and work to strengthen them
  - the *swashbucklers* will gain independence quickly
  - the *good communicators* will “own” their work
  - those with *flexibility* and *good time management* will work smart and hard
  - the *self-motivated* will do all of the above while the research mentor is out of town
  - those that *enjoy Science* will do all of the above with a smile on their face... most of the time!

# Time for Questions!

If you like, compose a thoughtful question for the panel on the notecard provided.

Use this QR code to access the exit survey for this session. Tell us how we can make it better!

