December 2019 • Issue #510

# AMSTATNEWS

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## BEYOND BIG DATA: COLLABORATION IN SCIENCE, INDUSTRY, AND SOCIETY

PITTSBURGH, PA • JUNE 3–6, 2020

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# AMSTATNEWS

DECEMBER 2019 • ISSUE #510





*Amstat News* welcomes news items and letters from readers on matters of interest to the association and the profession. Address correspondence to Managing Editor, *Amstat News,* American Statistical Association, 732 North Washington Street, Alexandria VA 22314-1943 USA, or email *amstat@amstat.org*. Items must be received by the first day of the preceding month to ensure appearance in the next issue (for example, June 1 for the July issue). Material can be sent as a Microsoft Word document, PDF, or within an email. Articles will be edited for space. Accompanying artwork will be accepted in graphics file formats only (.jpg, etc.), minimum 300 dpi. No material in WordPerfect will be accepted.

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The American Statistical Association is the world's largest community of statisticians. The ASA supports excellence in the development, application, and dissemination of statistical science through meetings, publications, membership services, education, accreditation, and advocacy. Our members serve in industry, government, and academia in more than 90 countries, advancing research and promoting sound statistical practice to inform public policy and improve human welfare.

# features



Meet Regina Nuzzo

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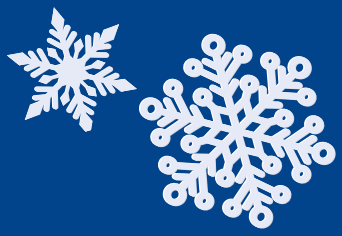
# columns



STAT*tr@k* is a column in *Amstat News* and a website geared toward people who are in a statistics program, recently graduated from a statistics program, or recently entered the job world. To read more articles like this one, visit the website at *http://stattrak.amstat.org*. If you have suggestions for future articles, or would like to submit an article, please email Megan Murphy, *Amstat News* managing editor, at *megan@amstat.org*.


All of us at the ASA join in wishing you a wonderful holiday season and a prosperous, healthy New Year!



# DATA4GOOD

## Researchers Fight Homelessness

In this months Stats for Good column, David Corliss looks at hackathons and how they're one of the best ways to get involved in fighting homelessness. Visit *http://magazine.amstat.org* to read about how you can run a successful hackathon and make a difference in people's lives.


## INSIDE

Look for your 2020 calendar in the center of this issue.

# departments



Barbara and Laura Wendelberger chat during the Opening Mixer at WSDS 2019. See more photos on Page 26.

# member news



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# The Year in Review … And More to Come

It has been a real honor to be ASA president and have the privilege of this forum to communicate with you. Some of you have taken the time to share your thoughts about these columns, which I've greatly appreciated.

Next month, the ASA enters its 181st year, with a new ASA president. It certainly will look different from the ASA of 1839, or 1939, or even 1999. In my last column, I will reflect on accomplishments of the past year, challenges ahead, and—last but most important—my experiences with you, our members, without whom the ASA would not exist.

David Williamson is leading the task group ASA as Enabler of Statistical Impact to create mechanisms to proactively identify areas ripe for statistical involvement. Susan Paddock is organizing a series of articles about inspiring topics the task group considered, including those related to autonomous vehicles, evaluating and comparing "deep learning" algorithms, modeling environmental impacts on physical systems, and reproducibility in science. David is also organizing a statistical impact competition, with entries due December 4. Future plans include a collaborative workshop at the ASA to pursue one or more of the topics that emerge as the most exciting. Some avenues for broadcasting these impacts include John Bailer's Stats + Stories, a special section of an ASA-sponsored journal, and possibly a competitive impact session at future JSMs. Stay tuned!

Julia Sharp and her task group are organizing a diversity and inclusion consortium, a forum for representatives of partner societies to share best practices and engage in joint initiatives for attracting diverse talent to STEM fields—statistics specifically. (Someday, perhaps "STEM" will become "STEMS," with the final S for statistics.)

The ASA has had an active Committee on Minorities since 1978, currently chaired by Dionne Swift. Its charge is to foster greater participation in statistics by the many historically under-represented groups and encourage research in the development, evaluation, and implementation of policies and interventions that improve the condition of minority populations in the US. It organizes two successful events each year: the Diversity Mentoring Program at JSM and StatFest, held in Houston this year.

Julia and her colleagues have been developing a dynamic resource repository for students, faculty, and industry partners to identify grants, conferences, and programs that support and enhance diversity and inclusion. The resource list will be disseminated through the ASA website. If you would like to contribute to the list now or in the future, submit your ideas at *https://forms.gle/dkhvp4ficjyrjTo89*.

The task group held its introductory consortium meeting last month with the National Association of Mathematicians and Math Alliance (which organizes the annual Field of Dreams conference with ASA support) and has contacted the Society for Advancement of Chicanos/Hispanics and Native Americans (SACNAS) to be a possible partner. We look forward to seeing the results of these interactions at future conferences.

Jessica Utts and Jun Yang have started an exciting collaboration between statisticians and computer scientists who wish to address the research and practical challenges associated with disinformation. With help from the ASA's staff, they have developed an impressive website of resources, which you can find at *https://sites.google.com/nonlinearlearning.org/confronting-disinformation/home*. They also have identified several important avenues for research (see *https://drive.google.com/file/d/14DAyh6_hBbwYo2aujj7rLfpwGLo9Vtix/view*) and are planning a workshop titled "Research Challenges in Disinformation."


Karen Kafadar

We had another successful JSM in Denver. Its superb program committee, led by Richard Levine, organized a terrific technical program (see *https://magazine.amstat.org/blog/2019/10/01/jsm-2019-reminiscing-on-the-impact*), with exciting presentations, a public lecture, workshops, and courses.

A significant ASA Board action in July was the adoption of a policy concerning appropriate behavior and a mechanism for addressing violations of it. That policy is in line with those endorsed by societies such as AAAS, the Institute of Mathematical Statistics (IMS), and the Statistical Society of Canada. The particulars may differ slightly, but they all agree on the basic principles.

Most exciting for all of us, 2004 ASA President Bradley Efron received the 2019 International Prize in Statistics from Committee Chair Susan Ellenberg in the presence of the five sponsoring societies' 2019 presidents: Helen MacGillivray (International Statistical Institute), Deborah Ashby (Royal Statistical Society), Louise Ryan (International Biometric

**Author's note:** My thanks to Barry Graubard and Dave Hoaglin for their comments on all my columns. Of course, I remain responsible for their contents.

Society), Susan Murphy (IMS), and me. In accepting the award, Brad warmly congratulated the statistics profession on a "clean sweep": all five societies had female presidents.

One final challenge, which I hope to address in my final month as ASA president, concerns issues of significance, multiplicity, and reproducibility. In 2016, the ASA published a statement that simply reiterated what *p*-values are and are not. It did not recommend specific approaches, other than "good statistical practice … principles of good study design and conduct, a variety of numerical and graphical summaries of data, understanding of the phenomenon under study, interpretation of results in context, complete reporting and proper logical and quantitative understanding of what data summaries mean."

The guest editors of the March 2019 supplement to *The American Statistician* went further, writing: "The *ASA Statement on P-Values and Statistical Significance* stopped just short of recommending that declarations of 'statistical significance' be abandoned. We take that step here. ... [I]t is time to stop using the term 'statistically significant' entirely."

Many of you have written of instances in which authors and journal editors—and even some ASA members—have mistakenly assumed this editorial represented ASA policy. The mistake is understandable: The editorial was coauthored by an official of the ASA. In fact, the ASA does not endorse *any* article, by *any* author, in *any* journal—even an article written by a member of its own staff in a journal the ASA publishes.

Even our own ASA members are asking each other, "What do we tell our collaborators when they ask us what they should do about statistical hypothesis tests and *p*-values?" Should the ASA have a policy on hypothesis testing or on using "statistical significance"?

Sir David Cox wrote in a 1966 *International Statistical Review* article, "Something like a significance test is needed for the essential task of checking and criticizing models and formulating improved ones, a key aspect of successful applied work."

For analyzing randomized clinical trials, John Tukey advised in a 1991 *Controlled Clinical Trials* article, "Results are reported in terms of *both* amount *and* statistical significance."

Robert Abelson in 1997 noted many things—"oboes, band saws, skis, and college educations"—are misused. He then asked, "Will we want to ban effect sizes too, when their misuse escalates?"

Substituting "significance" for another word (meaningful? important?) is not the solution. Indeed, as Yoav Benjamini noted in his Wald lecture given during this year's JSM, the real issue involves not just words, but rather critical statistical concepts including reproducibility, confidence intervals, and multiplicity.

"Sir Ronald's firm knowledge was *not one extremely significant result, but rather the ability to repeatedly get results significant at 5%*," according to Tukey in a 1969 *American Psychologist* article. Tukey also wrote that a point estimate by itself is useless. And he called our attention to "the problem of multiple comparisons" in 1953 (cited for decades as "unpublished manuscript," until all 300 pages appeared in Volume VIII of *The Collected Works of John W. Tukey* in 1994), which inspired Benjamini and Hochberg's false discovery rate in 1995.

To address these issues, I hope to establish a working group that will prepare a thoughtful and concise piece reflecting "good statistical practice," without leaving the impression that *p*-values and hypothesis tests—and, perhaps by extension as many have inferred, statistical methods generally—have no role in "good statistical practice." As Susan Ellenberg noted in her eloquent presentation at JSM (as the first recipient of the F.N. David award), both have served us well in our history, and many of our illustrious colleagues—past and present, frequentist and Bayesian—have relied on them. The ASA should develop—and publicize—a properly endorsed statement on these issues that will guide good practice.

My late business-minded father used to say, "The easy solution to a problem employee is to fire him." In other words, it takes a wise manager to find the talent in an employee and guide him (or her) to use it accordingly. And so it is with *p*-values. The easy way out is to abolish them. Our collective wisdom will be needed to guide others in using them properly. We as statisticians have work to do, and I hope you will help.

I end this column with grateful thanks to the many people who have left me with a lifetime of memories from 2019. It would be hard for me to overstate the impact statistics has had on me, both personally and professionally, especially this year. ASA staff, the board of directors, our hardworking committee and section officers, and our members from all over the world have been ever so collegial, informative, and gracious. The ASA would not exist without you, our members, and its staff to help us move in directions not foreseen by our predecessors. The research you have published, the projects you have conducted, and the communications you have shared have taught me much and so inspired me in my life. Thank you for welcoming me as your president this year, and may you continue to enrich the lives of others as you have so enriched my own.

# ASA Journals in Need of Editors

Journals are vital to the ASA's mission of promoting the practice and profession of statistics, and editors are at the heart of ensuring our publications continue to be world leaders in statistics research and applications.

If you or someone you know would be a great fit for one of the following editorships, send your application or nomination to *eric@amstat.org* by January 10, 2020.

## Editor, *The American Statistician*

### Term: 2021–2023, with the transition beginning July or August 2020

*The American Statistician* publishes articles of general interest to the statistical profession that ordinarily are not highly technical. The journal is organized into the following sections: Statistical Practice, General, Teacher's Corner, Statistical Computing and Graphics, Reviews of Books and Teaching Materials, Letters, History Corner, and Interdisciplinary.

For more information about *The American Statistician*, see Aims and Scope (*http://bit.ly/36KNHPJ)* and Editorial Board (*http://bit.ly/2Cu9A7O*).

## Editor, *Journal of Quantitative Analysis in Sports*

### Term: 2021–2023, with the transition beginning July–September 2020

Articles in *JQAS* come from a variety of sports and perspectives and focus on such subjects as tournament structure, frequency and occurrence of records, and the optimal focus of training for decathlons. Additionally, the journal serves as an outlet for professionals in the sports world to raise issues and ask questions that relate to quantitative sports analysis. Articles come from a diverse set of disciplines, including statistics, operations research, economics, psychology, sports management, and business.

For more information about *JQAS,* see *www.degruyter.com/view/j/jqas.*

## Editor, *Statistical Analysis and Data Mining*

### Term: 2021–2023, with the transition beginning July–September 2020

*SAM* (*https://onlinelibrary.wiley.com/journal/19321872*) is published by John Wiley & Sons on behalf of the American Statistical Association. SAM addresses the broad area of data analysis, including data mining algorithms, statistical approaches, and practical applications. Topics include problems involving massive and complex data sets, solutions using innovative data mining algorithms and/or novel statistical approaches, and the objective evaluation of analyses and solutions. Of special interest are articles that describe analytical techniques and discuss their application to real problems in such a way that they are accessible and beneficial to domain experts across science, engineering, and commerce.

*SAM* publishes six issues (February, April, June, August, October, December) and receives about 120 submissions per year. ■

## Latest Issue of *Significance* Asks Many Questions

During World War II, more than 2,300 V-1 "flying bombs" fell on London, killing an estimated 5,500 people. Londoners observed at the time that bombs seemed to fall in clusters. But were these apparent clusters the result of targeting or random chance?

In the October 2019 issue of *Significance,* Liam P. Shaw and Luke F. Shaw follow in the footsteps of R. D. Clarke, the actuary who sought to answer this question. While telling Clarke's story, they recreate his analysis using modern data science tools.

Also in this issue:

- Mainstream media are regularly accused of being biased. But are the accusations fair? Siddhartha Dalal, Berkay Adlim, and Michael Lesk investigate.
- Would a billion-dollar investment in improved street lighting make Australian roads safer at night? Paul Marchant finds the evidence wanting.
- Ahead of the American Statistical Association's 180th birthday and the start of the 2020 US Census, Lynne Billard explores the integral role the ASA has played in shaping, refining, and strengthening a central pillar of US democracy.

*Significance* is online at *www.significancemagazine.com*.

# (Bio)Statistics Bachelor's Degrees Nearly Quintuple This Decade

## *Highlights from 2018 Degree Release*

The decade of statistics continues with strong growth in the number of statistics and biostatistics degrees awarded annually. According to the latest preliminary data release from the National Center for Education Statistics, bachelor's degrees grew 17 percent from 2017 to 2018 to 3,964 (33 of which are for biostatistics) and master's degrees increased 5 percent to 4,235 (720 for biostatistics). Doctoral degrees increased by 11 percent to 688 (206 for biostatistics), as seen in Figure 1.

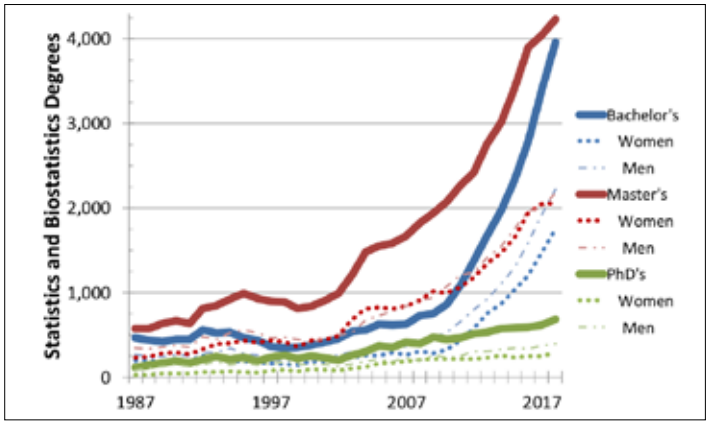


**Figure 1:** Statistics and biostatistics degrees at the bachelor's, master's, and doctoral levels in the United States for 1987–2018. The dotted lines of matching colors are the number of degrees for that degree level earned by women. Source: NCES IPEDS

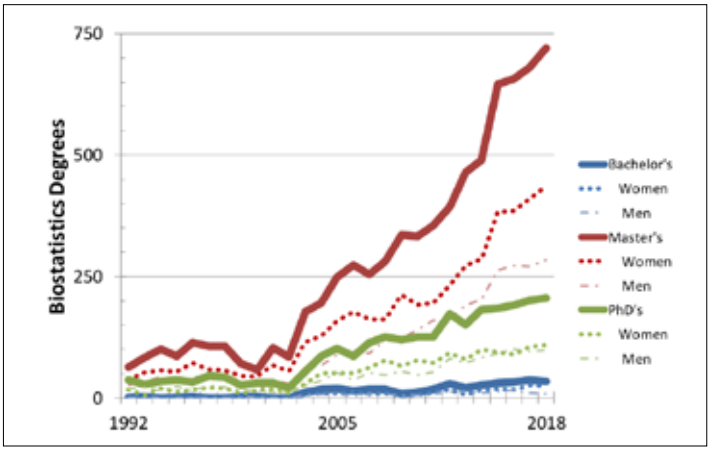


**Figure 2:** Biostatistics degrees by degree level awarded in the United States. The dotted lines on matching colors are the number of degrees for that degree level earned by women.

The 2018 numbers for bachelor's degrees are 4.6 times than that of 2010; for master's, two times; and for doctoral, 1.5 times. Isolating on just biostatistics degrees, the growth for this decade has been a factor of 2.7 for bachelor's (12 to 33), 2.2 for master's, and 1.6 for doctoral, as shown in Figure 2. Isolating on statistics degrees, the number of annual bachelor's degrees surpassed the number of master's degrees for the first time since at least 1987 in 2017, as illustrated in Figure 3.

The increase in the number of universities granting statistics and biostatistics degrees also continues steadily. For the period from 2017 to 2018, those granting bachelor's degrees in statistics increased from 132 to 138, master's degrees in statistics from 143 to 146, and doctoral degrees in statistics from 69 to 72, as seen in figures 4 and 5.

Twenty-three universities granted statistics and biostatistics degrees for the first time (at least since 2003) in 2018:

- **Bachelor's degrees in biostatistics** (1): Saint Louis University
- **Bachelor's degrees in statistics** (10): Arizona State University-Polytechnic, Jackson State University, Marquette University, The Pennsylvania State University-World Campus, Southeastern University, Texas A&M University, Truman State University, University at Buffalo, Ursinus College, Western Washington University
- **Master's degrees in statistics** (3): Wake Forest University, Western Illinois University, Claremont Graduate University
- **Master's degrees in biostatistics** (4): American University, Portland State University, University of California-San Diego, University of Miami
- **PhD in biostatistics** (2): Southern Methodist University, University of Georgia
- **PhD in statistics** (3): Central Michigan University, Indiana University, Washington University

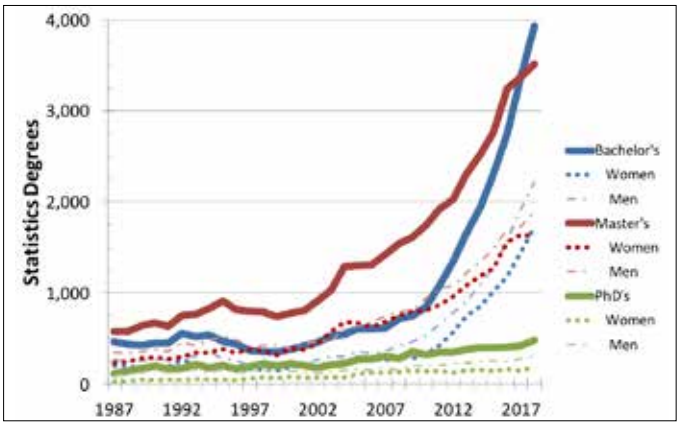


**Figure 3:** Statistics degrees by degree level awarded in the United States. The dotted lines on matching colors are the number of degrees for that degree level earned by women.

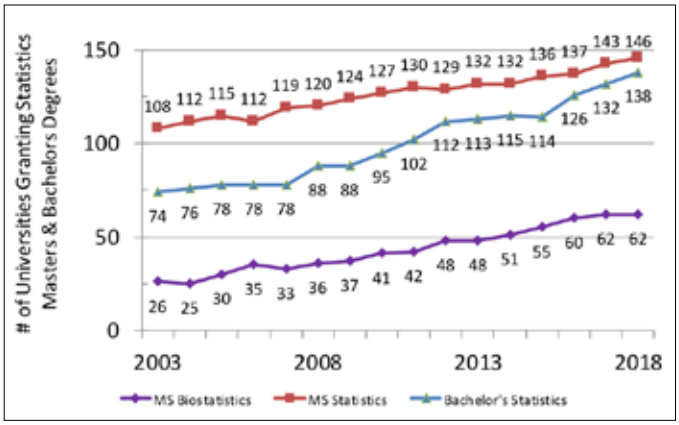


**Figure 4:** The number of universities granting statistics and biostatistics master's and bachelor's degrees. Compiled from NCES IPEDS data.

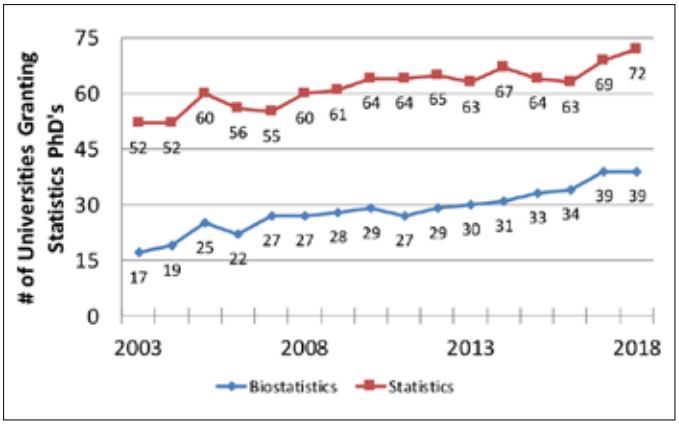


**Figure 5:** The number of universities granting statistics and biostatistics PhDs. Compiled from NCES IPEDS data.

The top degree-granting institutions over the last five years are in the following tables for all categories except biostatistics bachelor's degrees. The comprehensive list is available at *www.amstat.org/asa/education/Statistics-and-Biostatistics-Degree-Data.aspx.*

**Tables 1–5:** Top five universities granting statistics and biostatistics degrees for 2011–2015.

| Statistics PhDs | 2014 | 2015 | 2016 | 2017 | 2018 | 2014–2018 | 2003–2018 |
|---|---|---|---|---|---|---|---|
| North Carolina State University | 17 | 19 | 20 | 19 | 25 | 100 | 283 |
| Iowa State University | 28 | 14 | 9 | 18 | 27 | 96 | 209 |
| University of Wisconsin | 10 | 13 | 24 | 15 | 17 | 79 | 208 |
| The Ohio State University | 13 | 14 | 12 | 6 | 12 | 57 | 146 |
| The Pennsylvania State University | 9 | 17 | 14 | 6 | 9 | 55 | 151 |
| Duke University | 12 | 9 | 8 | 12 | 14 | 55 | 120 |
| **Subtotal** | **89** | **86** | **87** | **76** | **104** | **442** | **1117** |
| **Total** | **397** | **396** | **402** | **419** | **482** | **2096** | **5385** |

| Biostatistics PhDs | 2014 | 2015 | 2016 | 2017 | 2018 | 2014–2018 | 2003–2018 |
|---|---|---|---|---|---|---|---|
| The University of North Carolina | 22 | 24 | 16 | 14 | 17 | 93 | 205 |
| U of Texas Health Science Center | 7 | 19 | 15 | 13 | 19 | 73 | 133 |
| Harvard University | 13 | 12 | 9 | 14 | 16 | 64 | 168 |
| University of Michigan | 12 | 11 | 11 | 13 | 15 | 62 | 165 |
| University of Pittsburgh | 14 | 18 | 5 | 10 | 8 | 55 | 133 |
| **Subtotal** | **68** | **84** | **56** | **64** | **75** | **347** | **804** |
| **Total** | **151** | **181** | **185** | **190** | **201** | **967** | **2227** |

**Tables 1–5:** *(continued)*: Top five universities granting statistics and biostatistics degrees for 2011–2015

| Statistics Master's Degrees | 2014 | 2015 | 2016 | 2017 | 2018 | 2014–2018 | 2003–2018 |
|---|---|---|---|---|---|---|---|
| Columbia University | 287 | 396 | 435 | 441 | 454 | 2013 | 3956 |
| George Washington U | 155 | 118 | 132 | 117 | 88 | 610 | 785 |
| Rutgers University | 94 | 96 | 106 | 78 | 124 | 498 | 1074 |
| The University of Chicago | 30 | 28 | 119 | 99 | 155 | 431 | 662 |
| University of Michigan | 46 | 57 | 74 | 81 | 119 | 377 | 784 |
| **Subtotal** | **612** | **695** | **866** | **816** | **940** | **3929** | **7261** |
| **Total** | **2489** | **2769** | **3249** | **3366** | **3515** | **15388** | **32742** |

| Biostatistics Master's Degrees | 2014 | 2015 | 2016 | 2017 | 2018 | 2014–2018 | 2003–2018 |
|---|---|---|---|---|---|---|---|
| Columbia University | 34 | 50 | 68 | 52 | 84 | 288 | 442 |
| Boston University | 45 | 52 | 49 | 49 | 25 | 220 | 396 |
| University of Michigan | 24 | 41 | 32 | 40 | 49 | 186 | 421 |
| Harvard University | 16 | 32 | 36 | 42 | 28 | 154 | 244 |
| Emory University | 17 | 19 | 23 | 36 | 30 | 125 | 205 |
| **Subtotal** | **136** | **194** | **208** | **219** | **216** | **973** | **1708** |
| **Total** | **495** | **659** | **672** | **693** | **730** | **3249** | **6593** |

| Statistics Bachelor's | 2014 | 2015 | 2016 | 2017 | 2018 | 2014–2018 | 2003–2018 |
|---|---|---|---|---|---|---|---|
| UC Berkeley | 160 | 215 | 174 | 215 | 226 | 990 | 1679 |
| Purdue University | 197 | 183 | 211 | 199 | 197 | 987 | 1388 |
| University of Illinois UC | 91 | 111 | 143 | 179 | 229 | 753 | 1014 |
| UCLA | 66 | 71 | 127 | 128 | 157 | 549 | 698 |
| UC Davis | 54 | 60 | 110 | 127 | 179 | 530 | 808 |
| **Subtotal** | **568** | **640** | **765** | **848** | **988** | **3809** | **5587** |
| **Total** | **2019** | **2367** | **2851** | **3458** | **4030** | **14725** | **24227** |

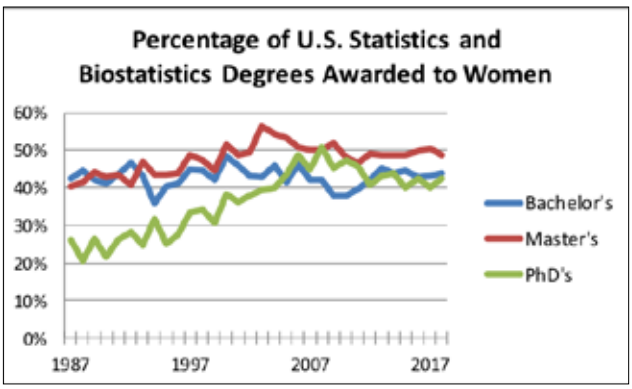


**Figure 6:** Percentage of statistics and biostatistics degrees awarded to women by degree level for 1987–2018. Source: NCES IPEDS

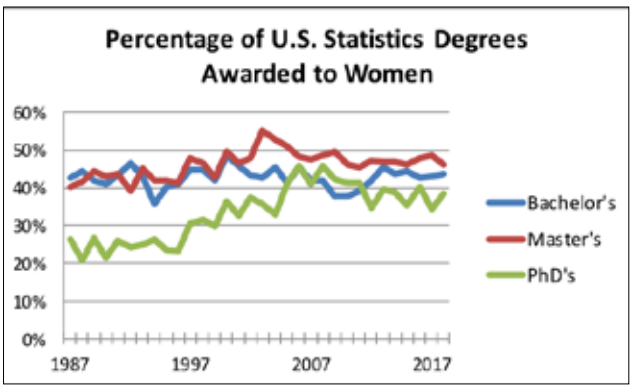


**Figure 7:** Percentage of statistics degrees awarded to women by degree level for 1987–2018. Source: NCES IPEDS

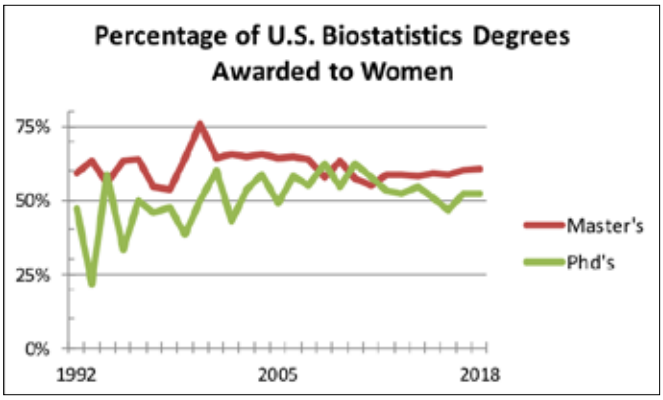


**Figure 8:** Percentage of master's and PhD biostatistics degrees awarded to women for 1992–2018. Source: NCES IPEDS

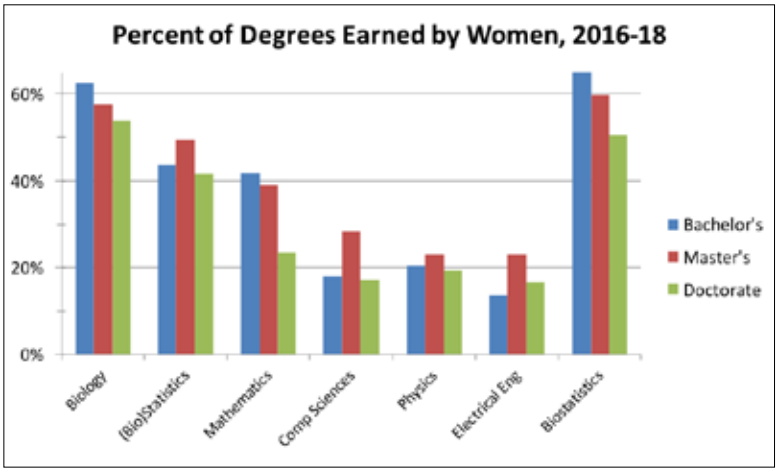


**Figure 9:** Percentage of statistics and biostatistics degrees earned by women compared with five much larger fields. "(Bio)Statistics" is both statistics and biostatistics. Source: NCES IPEDS using CIP code 11.07 for computer science, 14.10 for electrical engineering, 26.01 for biology, 27.01 for mathematics, and 40.08 for physics

## Demographics

Following our practice to alternate demographics updates, we look at the breakdown of degrees earned by men and women this year. Last year's update, which was based on 2017 degree data, had figures for the percentage of statistics and biostatistics degrees earned by nonresident aliens and for race and ethnicity data for the degrees granted to US citizens or residents. The file with the race/ethnicity data at *www.amstat.org/asa/education/Statistics-and-Biostatistics-Degree-Data.aspx* has been updated with the 2018 data.

Figures 6–8 show the percentage of degrees earned by women over time by degree level for combined statistics and biostatistics, statistics only, and biostatistics only. The percentage of women earning biostatistics degrees is higher than that of men for all degree levels. For statistics, the percentage of men earning degrees is higher at all levels. The percentage of PhDs earned by women has declined modestly over the last decade, while the same percentage for bachelor's degrees has rebounded to prior levels. Nonetheless, the percentage of women earning statistics and biostatistics degrees is generally better than other quantitative STEM fields, especially at the graduate degree levels and for those in the physical, mathematical, and computer sciences, as illustrated in Figure 9. ■

# ASA-AAAS Mass Media Fellow Shares What She Learned

Diana Cai

Cai

**MORE ONLINE**
Visit the AAAS website for details: *www.aaas.org/fellowships/mass-media.*

This past summer, I reported from STAT—a Boston-based health and medicine news outlet—as an ASA-AAAS Mass Media Fellow. It was a fantastic foray into the world of journalism, and it was a tremendous opportunity to learn from the writers and editors at STAT.

I published six stories over the summer. A few stories arose from scientific studies, including one from an analysis of CDC survey data that found LGBT individuals have an increased risk of memory loss and confusion—early markers of dementia—compared to their counterparts (see *www.statnews.com/2019/07/14/lgbt-memory-problems-survey-alzheimers*). Two stories I particularly enjoyed working on are features that allowed for deeper exploration of topics: one on a nonprofit organization, Seeding Labs, that recycles lab equipment from high-income countries and redistributes it to low-income countries (see *www.statnews.com/2019/08/09/seeding-labs-equipment-research-home-countries*) and one on the motivations and increasing trend of Chinese-born, US-trained scientists returning to China rather than staying in the US long term for their careers (see *www.statnews.com/2019/09/03/amid-us-scrutiny-chinese-scientists-return-home*). Some of the conclusions I drew for the China story came from exploring a couple data sets, so having a grasp of statistics certainly helped. Both features were reprinted by *The Boston Globe*. It was great to learn how to think about and write articles in different styles.

In reporting for the stories, I had the chance to learn from scientists all over the world. It was fascinating to learn about the range of challenges afflicting different countries, as well as cultural differences in the scientific communities. My experience as a reporter was a great way to connect with people who I probably would not have had the opportunity to speak with and helped broaden my perspective on scientific communities around the world.

The other STAT summer interns and I also met with writers and editors throughout the newsroom. We learned about the different paths each took in their careers. Some started out in science journalism, while others took circuitous routes and reported or edited other beats before ultimately winding up in health and medicine. It was interesting to learn about the career paths everyone took, their current work, and their general thoughts about journalism.

STAT is affiliated with The Boston Globe Media company, so we attended weekly meetings with *The Globe* interns. We had the opportunity to learn from reporters and editors from different departments of *The Globe*—from those covering breaking news to features to investigative reporting. It was fascinating to hear about the range of stories covered and the differences in reporting styles between departments.

During my time at STAT, I improved my communication skills, learned to conduct interviews, and developed a sense for interesting stories. Professionally, I enjoy science, so I am continuing to pursue a career in biological research. After the summer interlude, I returned to drug discovery research as a scientist at a pharmaceutical company. I work on a team of experimental and computational biologists that conducts genetic screens to identify promising drug targets in several disease areas, including oncology, immunology, and neuroscience. The summer I spent as a reporter has sharpened the questions I ask and made me a better scientist.

I do hope I will have the opportunity to contribute to science writing or journalism at some point. It is so much fun, and there are so many remarkable stories to tell.

For anyone who recently received or is pursuing a graduate degree in a STEM field

## Apply for an ASA-AAAS Mass Media Fellowship

Students, are you interested in journalism? Do you want an invaluable experience that also advances a statistical perspective in journalism? If so, apply for the ASA-AAAS Mass Media Fellowship (*www.aaas.org/fellowships/mass-media*) and spend 10 weeks with a media outlet next summer. Applications can be found at *www.aaas.org/fellowships/mass-media/apply* and will be accepted until January 1.

Led by AAAS and supported by many organizations, the fellowship is designed to "enhance coverage of science-related issues in the media in order to improve public understanding and appreciation of science and technology."

The AAAS eligibility requirements include being an upper-level undergraduate or graduate student or postdoctoral trainee in a STEM field and a US citizen or holder of a visa allowing paid work in the United States. To be the ASA-sponsored AAAS Mass Media Fellow, you must have had substantial statistical training with a preference—but not a requirement—for having or seeking a degree in statistics.

and is interested in science communication and journalism, I highly recommend applying for an ASA-AAAS Mass Media fellowship. Whether you already know you want to pursue science journalism as a career or are still trying to figure out a career path, the fellowship is a great opportunity. Reporting stories is similar to conducting research in many ways, so you can put the skills you developed during grad school to good use. ■

# ASA to Provide Ongoing Ombuds Service

### PROVIDE FEEDBACK

If you have any questions or feedback about the ombuds service, email them to Donna LaLonde at *DonnaL@amstat.org*. You may also provide comments via the ASA Activities Conduct Policy Public Comment Community (*http://bit.ly/2NSETyL*). Log in to the community to make discussion posts to provide public comments, which may be posted anonymously.

The ASA strives to be a community that welcomes and supports people of all backgrounds and identities. Furthering our commitment to providing an atmosphere in which personal respect and intellectual growth are valued and the free expression and exchange of ideas are encouraged, the ASA is introducing a program to provide ongoing, independent, confidential ombuds services.

The ombuds provides support if you have experienced or are aware of violations of the ASA's Activities Conduct Policy (*http://bit.ly/2K4ct3B*, which now includes the ASA's Policies and Procedures for Reporting, Investigating, and Adjudicating Violations (*http://bit.ly/33wVgr4*).

The ombuds will do the following:

- Listen impartially and act as a sounding board for concerns
- Provide general resource information and make appropriate referrals
- Facilitate exploration of options and ways of moving forward
- Coach individuals to have constructive communications
- Give sound and practical advice to empower individuals to self-advocate

If the issue is not resolved through the ombuds process, the ombuds will recommend the ASA pursue an investigation of the complaint.

## What About Confidentiality?

The ombuds will keep all information you provide confidential unless they assess and find an imminent risk to safety.

They will provide entirely anonymized conflict trends and patterns to the ASA to identify policy weaknesses, systemic gaps, and potential or evolving issues.

## How Can I Contact the Ombuds?

Email *AMSTAT_ombuds@protonmail.com* and indicate whether you would prefer to have a telephone conversation or communicate through this dedicated and confidential email address.

An ombuds will respond to you as soon as possible but within three business days. ■

# Staff Spotlight: Regina Nuzzo


Regina Nuzzo teaches her short course, "Communicating Quantitative Information Is Hard! Strategies for Success," during this year's Women in Statistics and Data Science Conference in Bellevue, Washington.

"Statistics is fun, fascinating, and powerful." That's the message Regina Nuzzo, the new senior advisor for statistics communication and media innovation at the American Statistical Association, plans to share with a wide variety of audiences. In this newly created role tailored to her expertise, Nuzzo will help the ASA improve communication of statistics policy issues, bring more statistics to journalists and journalism, and enhance public engagement and communication skills for statisticians and statistics students.

Most recently, Nuzzo was a professor at Gallaudet University, where she had been on the faculty since 2006. She holds a bachelor's degree in industrial engineering from the University of South Florida and a PhD in statistics from Stanford University. She is also a 2004 graduate of the science writing program at the University of California, Santa Cruz, where she learned to write about math, science, and health for a variety of audiences. Her feature article about *p*-values (*https://go.nature.com/2p4HVHM)* earned her the American Statistical Association's 2014 Excellence in Statistical Reporting Award, and she facilitated the working group that produced the precedent-setting 2016 ASA *p*-values statement (*http://bit.ly/34GjWxC*). Her writing has appeared in such publications as *The New York Times, Los Angeles Times, ESPN the Magazine, Reader's Digest, Scientific American, New Scientist, Science News,* and *Nature.*

We wanted to know more about Nuzzo, so we asked her the following questions and she graciously answered, offering us a window into her communication style.

**You have an unusual background as a statistician and science journalist. Do these two fields complement each other, and if so how?**

Statisticians and science journalists are more alike than you might think! In statistics, we find the signal in the noise; in science journalism, we find the story among the facts. It's a similar mindset: Given a mass of messy information, what's most important? What's most useful? What's still unknown? Statistics is actually great training for journalism, and vice versa.

**During the Women in Statistics and Data Science Conference, you participated in a panel called "Working and Thriving with Disability in the Statistical Sciences." How did it feel to discuss your disability? What are some of the issues you have had to deal with in your career regarding your deafness?**

That panel was a terrific experience. There were four of us participating with a large audience, and for some of us, it was the first time we'd discussed our disability in public. We all had lunch together and bonded over our shared experiences. I was really proud to be part of that group! One interesting thing is we all experience cognitive drain. For me, I use a cochlear implant and read lips, but still, listening to someone is always a matter of dealing with missing information. It feels like trying to do crossword puzzles in real time. The more clues I have the better—like having a good Bayesian prior!—but it's never easy. I'm always working to fill in the gaps, and that means less brainpower left over for other important things.

**Tell me a little about your role as the ASA Senior Advisor for Statistics Communication and Media Innovation.**

First of all, it's a brand-new position with a brand-new approach—there's nothing else like this out there. Over the past decade, the communication of scientific information has grown in visibility and importance: There are research centers, training programs, journalism jobs, even faculty positions dedicated to science communication. My dream is for statistics communication to be recognized as just as important, if not more so. People are starting to realize that there needs to be more focus on the effective communication of statistical information, and they're looking for help to make that happen. This new position is just one way the ASA is being proactive and innovative and taking a lead in this area. It's very exciting.

People are starting to realize that there needs to be more focus on the effective communication of statistical information, and they're looking for help to make that happen.

**What are your priorities for this role?**

The role is still evolving, but right now I have three main priorities: one, to bring more knowledge and experience with statistics to journalists; two, to bring more opportunities and experience with communication to statisticians; and, three, help share more of the fun and power of statistics with the general public. I'm really looking forward to working with members on projects for these areas! At JSM, I talked with a lot of members who were really passionate about good communication and got some great suggestions from them. Everyone is always welcome to drop me a line or give me a call to chat more about the media or stats communication.

**Can you give us any "sneak peeks" of projects you are working on?**

Here's something that hasn't been announced widely yet: the new Interest Group for Quantitative Communication. We already have more than 100 signatures on the petition! The proposed charter is going to the Council of Sections representatives for feedback and then to the Council of Sections Governing Board for a final vote. If it's approved, it'll give an official home to ASA members interested in communicating data, statistics, and other quantitative information in all kinds of formats—written language, spoken language, visualization, and anything else you can think of. I think this is going to meet a real need, both within the ASA and beyond. If anyone is interested in getting more involved with setting up this "Quant Comm" Interest Group, get in touch! ■

**MORE ONLINE**
You can follow Regina on Twitter @ReginaNuzzo.

Reach out to Nuzzo at *regina@amstat.org*.

# June CNSTAT Workshop Focused on Privacy

Jerry Reiter, Lars Vilhuber, and Tom Krenzke, ASA Privacy and Confidentiality Committee Members

**MORE ONLINE**
A link to the workshop program, including presentations, is at *http://bit.ly/2CrAX2I*.

For decades, federal statistical agencies have striven to balance the legal and ethical obligations to protect the confidentiality of data subjects with the need to provide informative statistics and access to data for secondary analysis. In recent years, balancing these objectives has become increasingly difficult. The digital revolution has seen an explosion in the growth of available data, both from public and private sources, which ill-intentioned actors could use to compromise confidentiality protections.

With these challenges in mind, the Committee on National Statistics (CNSTAT) of the National Academy of Sciences held a workshop June 6–7 to discuss new approaches to protecting data confidentiality, with a focus on methods that offer formal guarantees of privacy protection such as differential privacy. The discussions covered policy and implementation issues from both provider and user perspectives, including the promises and limitations of using formal privacy methods.

The workshop began with examples of potential disclosures from data protected by legacy disclosure protection methods. The examples highlighted how ill-intentioned actors can use information external to the released data to breach data confidentiality. A key takeaway from the introductory talks was how difficult it is to feel confident data are safe, as there are always attack strategies agencies may not conceive of when applying legacy disclosure protection methods. Indeed, one of the appealing promises of formal privacy approaches is to augment confidence in the data protection. Another takeaway is that it can be useful for agencies to have friendly hackers attack their databases and assess their vulnerabilities.

Participants heard from agency heads and staff about challenges they face in trying to put disclosure avoidance into practice. One challenge that was often repeated was the human capital and staffing challenge. Agency staff have many responsibilities, and for many agencies, disclosure avoidance is not a primary job assignment. This a difficult challenge to overcome; however, it may be possible for agencies to leverage expertise in academia and the private sector through partnerships. For example, many of the computer scientists involved in modernizing the disclosure control methods for the 2020 decennial census are on the Census Bureau payroll as part-time, Schedule A employees. Another example of partnerships is the National Census Research Network, which Robert Groves—now of Georgetown University—created with the National Science Foundation when he was the head of the Census Bureau.

The audience saw a tutorial on differential privacy and heard from a panel of experts about what can and cannot be done. These sessions offered several takeaways. First, there exist many differentially private algorithms that can handle many statistical tasks, from counting to regression modeling. Second, differentially private algorithms are not panaceas. In particular, there are data dissemination tasks for which no differentially private algorithms exist that produce outputs with high enough quality to be fit for use. It is clear there is still much research to be done in practical implementations of differential privacy.

Another important takeaway, mentioned multiple times, is that agencies should think about differentially private algorithms as supplementary tools in the disclosure protection toolkit, not as all-encompassing replacements. Agencies do not necessarily have to take an all-or-nothing approach. For certain problems, differential privacy is an achievable criterion. For others, agencies may—as a policy matter—use other solutions or hybrid solutions. One presentation

provided evidence that modern privacy protection methods may not add much error compared to other sources of error.

The second day started with a panel involving users and stakeholders. Panel members stressed the importance of involving user communities and stakeholders in the decisions for privacy policies. Agencies must help their user communities and stakeholders understand the impacts of changes in privacy protection methods on the types of analyses and decision tasks they care about. A key theme underlying many of the talks was that it is no longer acceptable for agencies and other data stewards to simply say "here's the data, we know best how to make it, now you can use it." Recent agency changes in privacy protection methods have inspired analysts to ask more questions about the impact of the agency's actions—including editing, imputation, and privacy protection—on inferences.

Many audience questions focused on what one might call policy decisions. Panelists raised those issues, as well. In particular, who decides what the privacy budget is? What are the implications for having to allocate that budget? If we're going to run out of the budget for a data set, are we going to have to let that data source expire? One panelist mentioned users were comfortable with deviations from the confidential data estimates in one case. This inspired questions around what it means to have acceptable deviations.

The final session comprised lightning talks. Staff from various agencies and other organizations gave five-minute presentations about challenges and solutions they're working on for issues in privacy.

CNSTAT plans to continue the conversation on privacy in future activities. This is a critical issue facing all statistical agencies and is at the core of many agencies' missions. ■

# 2019 FTC Focus: Setting the Standard for Success in Quality

Adam L. Pintar, 2019 FTC General Committee Chair

The 63rd annual Fall Technical Conference (FTC) was held at the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, September 25–27. The FTC brings together researchers and practitioners from academia, industry, and government to discuss ways to more effectively use statistical methods for research, innovation, and quality improvement.

The conference theme, "Statistics: Setting the Standard for Success in Quality," highlighted the deep connections between statistics, standards, and quality. Three short courses were held September 25, with topics in experiment design (Martin Beezner of Stat-Ease), functional data analysis (Jiguo Cao of Simon Fraser University), and statistical process control (William Conover of Texas Tech University and Victor Tercero-Gómez of Tecnológico de Monterrey México).

There were four plenary and lunch speakers. Peter Parker from NASA opened the conference Thursday morning by discussing his experience with the rise of statistics and statistical thinking at NASA. ASA President Karen Kafadar spoke Thursday during the lunch session about eyewitness reliability, and Jim Filliben of NIST gave the W.J. Youden Address Thursday afternoon. The Friday lunch speaker was John Butler of NIST. He introduced and screened an Emmy-winning short film about Wilmer Souder, a pioneer in forensic science.

There were many highlights besides the plenary and lunch sessions. A session by Ron Wasserstein and Allen Schirm about the ASA's statement on *p*-values, titled "Time to Say Goodbye to Statistical Significance," generated discussions that continued into the evening social activities. The Friday afternoon panel session sponsored by SPES and titled "Training the Next Generation of Statisticians: What Do They Need to Know?" also led to a vigorous discussion and was a great way to close the conference.

Next year's conference with the theme is "Mining for Quality with Statistics and Data Science" will be held October 7–9, 2020, in Park City, Utah. It will be chaired by Richard Warr of Brigham Young University. Conference information and the call for papers are posted at *www.falltechnicalconference.org*. Abstracts for the contributed program must be submitted through the website by February 29, 2020. If you are interested in getting involved, contact Richard Warr for potential opportunities using the contact feature on the website. ■

**MORE ONLINE**
For more information about the 2019 conference, including the conference's sponsors and exhibitors, visit *www.falltechnicalconference.org/program2019.*

# New Graduate Data Science Programs, Continued

The proliferation of master's and doctoral programs in data science and analytics continues, seemingly due to the insatiable demand of employers for data scientists. *Amstat News* started reaching out several years ago to those in the statistical community who are involved in such programs to find out more. Given their interdisciplinary nature, we identified programs involving faculty with expertise in different disciplines—including statistics, given its foundational role in data science—to jointly reply to our questions.

## UNIVERSITY OF PITTSBURGH

**Ada O. Youk** is associate professor of biostatistics and director of the master's program in biostatistics.

**MS in Biostatistics with Concentration in Health Data Science (HDS)** *www.publichealth.pitt.edu/biostatistics/academics/ms/hds-concentration*

**Year in which first students graduated/expected to graduate:** 2021

**Number of students currently enrolled:** Fall 2020 will be the inaugural class of new HDS students. Two BIOST MS students transferred to the HDS concentration when it was made available to current students this fall.

### Describe the basic elements of your data science/analytics curriculum and how the curriculum was developed.

This is an in-person program with 40 credit hours. Prerequisite coursework includes two semesters of calculus and exposure to basic programming. Students in our program can be full time or part time. The curriculum consists of courses in the fundamentals of statistical theory and applications, programming languages (e.g., SQL, R, SAS, Python), data science, machine learning and database management, a statistical consulting practicum, epidemiology, and public health. The program also includes a culminating capstone course to prepare a thesis involving innovative data analysis or related to an internship experience. Opportunities for internships and assistantships are available as hourly employment.

The program was developed with substantial input from faculty in statistics, computing and information sciences, bioinformatics, and human genetics.

Graduates of the MS Program in Biostatistics will be able to do the following:

- Address health problems by appropriate problem definition, study design, data collection, data management, statistical analysis, and interpretation of results
- Demonstrate mastery of the theory underlying statistical methods
- Implement and utilize appropriate statistical methods
- Effectively communicate results of biostatistical analyses to scientific and lay audiences
- Apply research design principles to problems in public health
- Recognize strengths and weaknesses of approaches, including alternative designs, data sources, and analytic methods
- Determine the data best suited to address public health issues, program planning, and program evaluation

In addition, students in the HDS concentration will be able to do the following:

- Apply data curation and data management techniques such as data munging, data scraping, sampling, and cleaning to construct informative, usable, and manageable data sets for meaningful analyses

- Apply methods for big data and machine learning to reveal patterns, trends, and associations including visualization
- Effectively use a programming language (e.g., R and/or Python) for data management and statistical analysis

## What was your primary motivation(s) for developing a master's data science/analytics program? What's been the reaction from students so far?

We have successfully trained students for many years in traditional biostatistical theory and methods. However, the field of biostatistics is constantly evolving. Advances in technology in biomedical and public health research are generating complex high-dimensional and large-volume data. Standard biostatistical and computational methods are not always feasible, or even appropriate, for analyzing and interpreting such data. To address the needs of modern high-dimensional science, computationally intensive statistical methods have become a fundamental part of scientific research and a critical component in advancing public health. We created our concentration in health data science to keep pace with scientific needs and train graduate students properly for the evolving job market while ensuring a rigorous statistical foundation with traditional methodologies.

The response from our students has been overwhelmingly positive. Students are excited to master techniques that will set them up for success in the modern job market.

## How do you view the relationship between statistics and data science/analytics?

Statistics and data science are complementary. It is our philosophy that you cannot have one without the other. For this reason, we chose to create a concentration in health data science rather than a separate degree in data science. A concentration added to our traditional MS degree keeps a core of traditional biostatistical theory and methods while giving a unique focus in data science techniques combined with a central theme of public health.

## What types of jobs are you preparing your graduates for?

Health data scientist, biostatistician, bioinformatician.

## What advice do you have for students considering a data science/analytics degree?

Students should have a solid foundation in calculus, an interest in statistics and programming, and a passion for public health.

Students who graduate from our program will be able to handle all aspects of "big data"—including curation and management—and collaborate effectively with a researcher's questions through excellent statistical communication skills and translating between scientific questions and hypotheses and statistical concepts and results. They will also be able to perform robust computational and/or statistical methods and effectively communicate analytical results that are statistically and scientifically valid as well as understandable. Thus, students enrolling in our program will receive a comprehensive education—more so than what a separate degree in data science could offer—that will prepare them well to enter the modern job market.

## Describe the employer demand for your graduates/students.

Indications from job searches on Indeed, ZipRecruiter, and Glassdoor—as well as discussions with local employers—are that demand will be high. In fact, Glassdoor ranks data scientist as the #1 best job in America for 2019 and *Forbes* states, "IBM predicts demand for data scientists will soar 28 percent by 2020."

## Do you have any advice for institutions considering the establishment of such a degree?

Institutions must be willing to put extensive time and effort into the research and creation of the new program. There must be a shared vision with all collaborating parties on what is best for your students and how to train them properly for a competitive job market.

We chose to start with our strength (biostatistics) and expand from there. We researched other programs around the country and met with and received input from faculty within our university who had complementary expertise. This allowed us to collaborate with departments within and outside of our school and create a strong cross-disciplinary degree.

In addition to our new HDS concentration, we also created a genomics-focused cross-disciplinary concentration: statistical and computational genomics (*www.publichealth.pitt.edu/biostatistics/academics/ms/scg-concentration*).

## AMERICAN UNIVERSITY

Distinguished Professor **Jeff Gill** focuses on Bayesian hierarchical models, nonparametric Bayesian models, elicited prior development from expert interviews, and fundamental issues in statistical inference. He is co-director of the data science master's degree program at American University.

**Jane Wall** had extensive software industry experience before earning her PhD at Rice University in computational and applied mathematics. She initiated the data science program and teaches R and data science. She is codirector of the data science master's degree program at American University.

**Master of Science in Data Science** *www.american.edu/programs/shared/data-science/index.cfm* and *www.american.edu/spa/data-science*

**Year in which first students graduated/expected to graduate:** We will have our first student graduate this December, even though the program only officially started this year, because we had students who converted from a certificate program to the full master's program and had advanced through their coursework extensively.

**Number of students currently enrolled:** 48

**Partnering departments (indicate lead, if any):** College of Arts and Sciences, School of Public Affairs

**Program format:** In-person; 30 credit hours required; capstone course (Data Science Practicum) required for graduation; full-time and part-time options available

### Describe the basic elements of your data science/analytics curriculum and how the curriculum was developed.

- Required for admission: undergraduate degree in any major with 3.0 and basic statistics course (no GRE or letters of recommendation)
- 30-hour program—full or part-time, including nine hours in application track and a three-hour capstone

In 2016, American University developed a graduate certificate in data science as both a standalone program and a complement to other graduate degrees. The certificate consists of four courses (12 hours) in R for data science, regression, and statistical machine learning. This certificate was well received by students and became the technical core as we looked to expand the program into a master's degree. We formed an advisory board for the data science program prior to launching the master's degree with representatives of both business and government agencies. This advisory board helped form and improve the curriculum, as well as give guidance regarding internships and employment for our students.

American University's master of science in data science program prepares students to acquire, process, analyze, and present complex data. Students will master both the theoretical knowledge and practical skills used by data scientists in academia, industry, and government. Core courses such as statistical machine learning, data science, and statistical programming in R train students to clean, process, visualize, and archive modern data sets—including text, imagery, and biometric data—apply machine learning algorithms to real data; and use the mathematical and statistical language of data scientists.

We strongly believe data science is not just a technical field. Students need to understand the field their data belongs to in order to ask the right questions and deal with strange results or outliers in an effective manner. They must also be able to communicate their results to the nontechnical audience. To accomplish this, each student will choose an applied field in which they will analyze data and explain the associated issues in that field, culminating in their capstone experience in their final semester. Students take nine hours in their application track during their program. There are nine available tracks for students to specialize in: applied public affairs, business analytics, computer science, cybersecurity, environmental science, finance, international economic relations, investigative journalism, and microeconomic analysis.

Students are not expected to have extensive background knowledge of mathematics, but are required to attend a mathematics "boot camp" prior to the start of the program. This is an important component of the program because we do not restrict the bachelor's degree: Any accredited bachelor's degree is acceptable, meaning that we welcome students with backgrounds in the humanities, social sciences, and STEM fields. The program is designed to provide an "easy on-ramp," meaning prior advanced knowledge of mathematics, statistics, and computer science is not required. The program guides students who are new to data science using principles from

a basic starting point all the way through required cutting-edge content like machine learning, mathematical statistics, and advanced data handling. Furthermore, we eschew traditional academic constraints that raise barriers to convenient entry: There is no GRE requirement and admissions are done on a rolling basis. We believe data science training in the 21st century should not be constrained by conventions established for a different era.

In 2018, AU established its Center for Data Science to focus on the theoretical and practical research aspects of computer technology, software engineering, computer architecture, artificial intelligence, simulation, modeling, and related topics. The center hosts workshops and talks from leading experts in data science from around the world. Our students and faculty can further their knowledge by participating in these events. Part of the mission of the center is to develop graduate education opportunities. In this case, the center worked closely with the department of mathematics and statistics and the department of government to help develop the data science master's program. This arrangement has worked out well, as the Center for Data Science is able to provide administrative and institutional support for the master's program outside of a single traditional departmental structure.

## What was your primary motivation(s) for developing a master's data science/analytics program? What's been the reaction from students so far?

Research in the physical sciences and engineering were the engines of human development in the 20th century. We conquered the atom, traveled to the moon, developed digital computation and the internal combustion air-breathing jet engine. We discovered laser and fiber optic telephony, provided widespread electrification, and other important technical milestones. Conversely, the 21st century is shaping up to be dominated by the social and biomedical/health sciences. Data access and data analysis will play an indispensable part in our progress in understanding social, psychological, and physiological characteristics of what it means to be human. Our motivation is to train people who want to engage with the data revolution that is well underway in modern society. We are excited to provide high-intensity training in a geographic location that is at the epicenter of this rapidly changing environment: More data may be produced inside the Capital Beltway than outside of it.

Students have been enthusiastic about the program so far. They recognize that they are the first cohort, which means we are listening to their input and the program is evolving.

## How do you view the relationship between statistics and data science/analytics?

It is a well-known truism that data science is an umbrella term that encompasses statistics, computer science, data processing, business/government analytics, and even some subfields of mathematics. Therefore, it is difficult to see any one traditional academic department "owning" a data science program. Elements of traditional statistics graduate education will always be a core component of data science training. We need to teach probability, sampling, estimation, inference, data reduction, testing, decision theory, design, regression, and assessment.

This foundation of statistics knowledge will not change. But a standard statistical agenda alone does not help create the type of cutting-edge data scientists employers crave. These topics should be complemented with data wrangling; visualization; presentation; and the machine learning topics of classification, clustering, dimensionality reduction, reinforcement learning, and natural language processing. But expertise and ability in the combination of these skills requires computational skills, especially programming.

Steve Jobs famously said that "everybody in this country should learn to program a computer, because it teaches you how to think." Naturally, this is even more true for those who need to turn data into information. Therefore, computer science education will always be a key component of training data scientists.

The future of data science is not going to be strictly in rectangular data files, data dictionaries, and PDF codebooks. We have already seen a revolution in text analysis, biometric measurement, internet traffic, and large-scale social network data, just to name a few. Size is also a challenge for providers and analyzers of data since users will demand enhanced access to extremely large data collections such as genomics, Facebook, global satellite imagery collections, vector GIS, and internet traffic. Data science, even from its infancy, is much more focused on the problems associated with big data than traditional statistical work.

## What types of jobs are you preparing your graduates for?

We look at this in two ways. First, our core curriculum of seven courses (21 credits) is focused on the key elements that a data scientist needs in any relevant job: data wrangling, statistical inference, statistical modeling, software expertise, machine learning tools, and communication.

Since we also want to prepare students to do this kind of work in their area of interest, we have

nine applied tracks consisting of three courses (nine credits): public affairs, business analytics, computer science, cybersecurity, environmental science/GIS, finance, international economic relations, investigative journalism, and microeconomic analysis.

We are also working to add more of these applied tracks over the next few years. In our conversations with employers, we learned that the combination of technical skills and experience working with the exact type of data used in their institutions is a sought-after profile.

## What advice do you have for students considering a data science/analytics degree?

Data science is such a rapidly evolving field that there is an incredibly varied set of programs offered by universities. Students should consider several important features that will differ widely across programs. First, look at the prerequisites. Some programs will expect a relatively high level of mathematics, statistics, and programming experience before starting classes. If students do not meet these levels, it could be challenging to keep up from the start.

Second, consider what applied tracks or applied foci are offered. Is there an ability to add applied data science in an area you are interested in? This can be crucial for students who have a specific career goal for after the degree. For example, some data analytics programs are offered through business schools (as done here at American University in a completely different program than ours). This often means all the examples will be drawn from business problems. So, for example, a student interested in applying data science principles to biomedical questions will likely be unsatisfied with this component of the program.

Third, look at the placement outcomes. Is there a university placement office the data science program works with in a targeted fashion? If the program has been around for more than a few years, what is the placement record? Does the program liaise with local employers? Notice this last set of questions will distinguish in-person versus online programs to a great extent.

Fourth, when are classes offered? This is less of a concern with online programs, but many students pursuing a data science master's or related degree want to continue working full time and still enroll in a face-to-face program.

Finally, look at the backgrounds of the core faculty teaching in the program. They are likely to emphasize concepts that have been important in their research and occupational background. Are these areas important to you?

When we were designing the MS in data science here at AU, we were circumspect about positioning it away from other currently offered degrees so to have a unique new offering. On the technical scale, with regard to mathematical statistics, it sits between the traditional statistics master's here and the data analytics program in the Kogod School of Business.

We offer more traditional graduate statistical content than data analytics and more applied hands-on data analysis than statistics. While programming is an important component of data science, we do not believe in requiring courses on software design, system organization, prototyping, or operating system theory, which are not central to data science in daily practice. Having said that, we have a computer science track in the program that allows students interested in going in that direction to take three courses (nine credits) of computer science graduate courses such as database management, object-oriented programming, and computer networks.

## Describe the employer demand for your graduates/students.

It is well known that jobs in data science are available in every sector: industry, government, and academia. Every sector in the global economy is using data to make better management and policy decisions. Forbes and Glassdoor ranked data scientist as the number one job in America for the last three years, with a median base salary of $120,931. There is no perceivable end to this trend.

While we are a young program, we have already been approached by many institutions requesting contact with graduates or near-graduates. Part of this, of course, is our geographic location in the center of the data-generation world. The important part is employers can look at our curriculum for the MS in data science online and see the key skills they require. This is by design, since we spent time with these employers during the design of the program working to understand their needs.

## Do you have any advice for institutions considering the establishment of such a degree?

Our primary advice is to understand your market. The data science market is different in Washington than it is in Duluth. Data science is the quintessential 21st-century skill, but the way graduates are going to use those skills will differ dramatically based on region, economy, and institution.

Within the university, it is critical to have senior administration buy-in from the start. We reached a critical juncture when it became apparent there would be no department credit-taking and multiple units needed to cooperate or it would not get done. It also helped that departments outside the founding units could propose an applied track and therefore participate in a positive way without having to be part of the 21-credit core.

## VANDERBILT UNIVERSITY

**Master of Science in Data Science** *www.vanderbilt.edu/datascience/academics/msprogram/program-details*

**Program contact:** Amanda Harding, assistant director of the Data Science Institute and program coordinator, *datascience-grad@vanderbilt.edu*

**Year in which first students graduated/expected to graduate:** First class was fall 2019; graduation in spring 2021

**Number of students currently enrolled:** 31 in our first cohort

**Partnering departments (indicate lead, if any):** The MS program is housed in the Data Science Institute (DSI) at Vanderbilt University, which is a multi-disciplinary unit that serves all schools and colleges at Vanderbilt University and Vanderbilt University Medical Center. The departments of biostatistics, biomedical informatics, computer science, physics and astronomy, and political science have all made significant contributions to the DSI and MS program.

**Program leadership:** The director of graduate education for the data science master's program is Jeffrey D. Blume. The Data Science Institute has two codirectors: Andreas Berlind, associate professor of physics and astronomy, and Douglas Schmidt, professor of computer science.

**Program format:** The program is a two-year, four-semester full-time program that includes the completion and presentation of a capstone project.

From left: Jeffrey Blume, Douglas Schmidt, Amanda Harding, and Andreas Berlind. Photo by Joe Howell

**Jeffrey D. Blume** founded and directed Vanderbilt's graduate program in biostatistics before establishing the data science MS program. His research is on second-generation *p*-values, likelihood methods, large-scale inference, false discovery rates, mediation modeling, clinical trials, and prediction modeling with missing data.

**Douglas Schmidt** is the Cornelius Vanderbilt Professor of Computer Science, associate provost for research, and co-chair of the Data Science Institute (DSI). His research focuses on software patterns and optimizations that facilitate development of mission-critical middleware and mobile cloud computing applications.

**Amanda Harding** is the assistant director of the DSI and MS program coordinator.

**Andreas Berlind** is an associate professor of physics and astronomy and the director of graduate studies in astrophysics. His research focuses on measuring and modeling the clustering of galaxies in the universe using data from telescopes and computationally intensive simulations.

### Describe the basic elements of your data science/analytics curriculum and how the curriculum was developed.

Data science is an interdisciplinary field focused on extracting knowledge and enabling discovery from complex data. In our view, data science is a fusion of principles from statistics and computer science applied in domain-specific contexts. As such, critical thinking, communication, problem-solving skills, and domain-specific knowledge are emphasized throughout the curriculum.

We were fortunate to have the opportunity to create brand-new courses for the entire MS program. Because we did not have to repurpose existing classes, our curriculum is modern and highly focused on the essential elements of statistics and computer science that are relevant in the data science space.

In addition, we take a fully computational approach to teaching statistical principles. Limit theorems, assumptions, and fitting routines are all introduced, illustrated, and proven computationally. Resampling and Monte-Carlo techniques play a key role in the practice of statistics in our program, and students learn to think about and apply statistical rigor computationally. There is also equal emphasis on statistical inference and prediction concepts, as both play a role for successful data science practitioners.

Students are trained in three core areas (i.e., computation, data analysis, and practice), with an emphasis on imparting practical experience and sharpening soft-skills (e.g., teamwork, communication, leadership). The three core sequences (consisting of four classes each) are the following:

1. Computation: focuses on programming, data structures, computer systems, and methods
2. Data Analysis: focuses on data exploration, analysis, model building, prediction, inference, and algorithms

3. Practice: focuses on teamwork, communication skills, interpretation skills, case-studies, ethical standards, and cultural awareness

The computation and data analysis sequences are intentionally not labeled as computer science or statistics sequences. Faculty from multiple departments across Vanderbilt teach in both sequences, and concepts are reinforced across sequences. The traditional discipline-specific allegiances are purposely blurred in the classroom, just as they are in practice.

Prospective students must possess a BA or BS, submit GRE scores (verbal, quantitative, and analytical writing), three letters of recommendation, and a statement of purpose. The minimum requirements for admission are the following:

- Single variable calculus (one semester)
- Programming skill (past courses or professional experience)
- Experience with data analysis (past courses or professional experience)
- Evidence of computational experience

## What was your primary motivation(s) for developing a master's data science/analytics program? What's been the reaction from students so far?

We proposed a Master of Science program in data science to leverage Vanderbilt's existing expertise in biostatistics, biomedical informatics, computer science, and other disciplines, as well as blend Vanderbilt's big data, quantitative, and computational expertise from numerous departments and programs across the university.

Our program has just enrolled its first cohort this year. We have 31 students with a wide variety of backgrounds (e.g., computer science, statistics, math, journalism, anthropology, environmental science, quantitative psychology). The students are happy, engaged, passionate, and hard working. We have received a lot of positive feedback and valuable constructive criticism that we are using to improve the program.

## How do you view the relationship between statistics and data science/analytics?

Obviously, they are intertwined. Our view is that a working and computational knowledge of statistical principles in both inference and prediction are essential for successful data scientists and analytic experts. We have eased the traditional theoretical training and added a requirement that students demonstrate a working computational knowledge of, and an ability to apply, these principles in traditional data analysis and machine learning (prediction) contexts. We emphasize reproducible research, R and Python programming skills, and strong understanding of the principle of sampling distributions and resampling techniques. Our program has a stronger computational flavor than most statistics MS programs, and we tried to do this without sacrificing the introduction and analysis of key statistical principles.

## What types of jobs are you preparing your graduates for?

We are preparing our students for jobs that require strong problem-solving and communication skills. Our students will be well positioned to lead interdisciplinary teams to solve real-world problems. Jobs in industry, government, academia, and the nonprofit sector are all possible.

## What advice do you have for students considering a data science/analytics degree?

Our program is designed to be a professional degree; it is not designed to be a lead-in to a PhD program. Students should learn to think like a scientist and then program, simulate, evaluate, and communicate results accordingly. Students should be comfortable programming large and complex computational tasks in several languages, simulating data that can be used to evaluate methods, summarizing computational experiments in plain language, and working online to make analyses and reporting reproducible.

## Describe the employer demand for your graduates/students.

Students have not graduated yet, but judging from local interest for interns, we expect strong demand.

## Do you have any advice for institutions considering the establishment of such a degree?

Focus on interdisciplinary projects and find common ground between disciplines. The impact of your work is directly proportional to how accessible it is to those beyond your discipline.

## NEW YORK UNIVERSITY

**Marc Scott** is professor of applied statistics at NYU and codirector of the MS program in applied statistics for social science research (A3SR). Scott also codirects the Center for Practice and Research at the Intersection of Information, Society, and Methodology (PRIISM), which is closely aligned with the A3SR MS program.

**Jennifer Hill** is professor of applied statistics at NYU and codirector of the MS program in applied statistics for social science research. She also codirects PRIISM.

**MS in Applied Statistics for Social Science Research (A3SR)** Concentrations exist in Data Science for Social Impact and Computational Methods *https://research.steinhardt.nyu.edu/ash/applied_statistics*

**Year in which the first students graduated/are expected to graduate:** 2016

**Number of students currently enrolled:** 47

**Partnering departments:** Applied statistics, social science, and the humanities

**Program format:** In person; variable credit hours (34–44); optional thesis; mix of full-time and part-time students; mix of traditional and nontraditional students; internship required and many assistantships available

### Describe the basic elements of your data science/analytics curriculum and how the curriculum was developed.

The A3SR curriculum was developed after speaking with colleagues at other universities about their MS programs in statistics and data science. It was also informed by many years that both codirectors have spent collaborating with scholars in the social, behavioral, health, education, and policy sciences. Finally, it was and continues to be strongly influenced by feedback from employers, particularly in the government and not-for-profit sectors.

The feedback we heard was that graduates of MS programs in data science or statistics too often 1) are not readily able to apply what they learned in the classroom with real data for real problems, 2) are not prepared to learn/discover new approaches or create new solutions once in the field, 3) think they can solve an agency's problems with a model or algorithm, 4) need better training in data cleaning and reproducible coding practices, and 5) are not skilled at effectively communicating with their employers (this includes listening, writing, speaking informally, and presenting formally). Our course requirements augment a more traditional statistics curriculum to directly address these concerns. In addition, we offer additional courses in modern machine learning algorithms that are increasingly popular in both industry and other sectors.

All MS students are required to take the following core courses: intermediate quantitative methods; multivariate analysis; data science for social impact; causal inference; a practicum in statistical computing and simulation; multilevel models: nested data or growth curves; survey research methods or experimental design; generalized linear models and applied probability. Additionally, each student selects one of the following concentrations for three to four additional specialized courses: data science for social impact; computational methods; or general applied statistics. Students are also encouraged to explore interest areas with three to four electives in statistics and beyond. Finally, all students complete the culminating experience of statistical consulting while completing a related internship or research project.

### What was your primary motivation(s) for developing a master's data science/analytics program? What's been the reaction from students so far?

Given our success in training doctoral-level social and behavioral scientists in statistical methods, our deans encouraged us to develop an MS program. We decided we would only create a program if we could design it in a way that would be tailored to students and goals not addressed in many traditional statistics programs. We also noted that some of the most popular MS programs in data science downplay statistics training, which leaves their students at a disadvantage when employers assume they understand the basics of inference, hypothesis testing, and uncertainty quantification, let alone critical skills like research design, sampling, and measurement. Finally, given the increasing importance of collaboration and interdisciplinarity, we wanted to focus on skills that directly aid in working with people across fields and backgrounds.

Our graduates have been highly successful at getting jobs after graduating.

A3SR has small cohort sizes (20–25 per year) so we have the opportunity to get to know all our students. Our students are smart, motivated, and love to learn new things. They are the types of students who want to probe deeper and who are adept at figuring out how to teach themselves new ideas, methods, and programming languages so their learning extends far beyond the classroom. In addition, our students are supportive and collaborative—often working together to solve problems or complete projects. In fact, during a recruiting session for the program two years ago, one of our students described A3SR as having a "warm, supportive, and loving environment." Music to our ears!

## How do you view the relationship between statistics and data science/analytics?

We define data science as the use of data to understand and have an impact on the world. This includes how data are collected (e.g., sampling, scraping, research design, survey design, measurement) and turned into meaningful inputs (e.g., cleaning, measurement, covariate selection, feature creation), understanding the goal of the inference (e.g., causal versus descriptive or predictive), models and algorithms (e.g., flavors of parametric versus nonparametric, supervised versus unsupervised, Bayesian versus frequentist), and presentation of findings (e.g., visualization, written and oral translation for different audiences). Ethical considerations and the soft skills required to collaborate effectively with practitioners and other researchers pervade all these aspects of the data pipeline. We view statistics and computer science as core to the discipline, and contemporary data scientists are encouraged to hone their skills in both fields with the overarching goal of understanding the world and communicating that understanding to stakeholders honestly and transparently.

## What types of jobs are you preparing your graduates for?

Our students typically work as data scientists, research scientists, or consultants in the public or private sector to improve society at organizations like MDRC, Vera Institute of Justice, New York State Attorney General's Office, Global Ties for Children at NYU, Center for Education Policy Research at Harvard University, International Rescue Committee, and UNICEF. Additionally, our alumni are doctoral candidates in the following programs: biostatistics at Harvard University; statistics at the University of California, Berkeley; statistics at Hong Kong University; sociology at New York University; and international education at New York University.

## Describe the employer demand for your graduates/students.

Our graduates have been highly successful at getting jobs after graduating. As our program matures and more organizations have interactions with our students through internships, summer jobs, or project-based consulting, we are steadily increasing the number of employers who actively seek out our students to hire.

## Do you have any advice for institutions considering the establishment of such a degree?

The biggest challenge for an interdisciplinary program in this domain is balancing building theoretical foundations with developing practical skills. We emphasize both in our courses, augmenting more traditional coursework with a stronger emphasis on programming, learning through simulation, and project-based work in which students use real (messy) data to address scientific research questions.

Our students also develop skills through consulting projects with NYU faculty and internships. These activities allow our students to gain important experience working on collaborations with closely aligned programs such as those in public health; education; and social, behavioral, and policy science. ■

STAT*tr@k*

# Host a Career Panel to Connect with Statistics, Data Analytics Professionals

A career panel is an opportunity for students to receive advice for getting a job and being successful once in a job. Likewise, for those who are in industry, sharing experiences offers a chance to consider lessons learned on the job.

Every year, the University of Cincinnati ASA student chapter—named BearStats since the mascot of our university is the Bearcat—hosts a career panel of professionals from industry in statistics and data science.

The first step we take when planning this event is to determine potential panelists and reach out to them. One of the best ways to find potential panelists is through faculty members. We approach faculty members each year and ask them to recommend speakers. Then, we either contact potential panelists or ask faculty members to reach out on our behalf.

Another approach for finding panelists is to contact previous students we interacted with as teaching assistants or classmates. We also ask members from the professional Cincinnati Chapter to consider participating. This is a large and connected group of professionals who understand the mission of student ASA chapters, so they are typically happy to help.

Through these avenues, we maintain a list of professionals who can be contacted for current and future panel sessions.

We think it is essential for our panelists to be representative in terms of training, industry type, and community. We contact alumni from different communities to represent the diversity of students in our chapter. Specifically, we form the panel with a combination of domestic and international professionals who can answer corresponding questions. We also invite professionals in entry-level technical and managerial positions.

Once we confirm the panelists, one of the challenges we face is encouraging students to attend. We market our event in myriad ways. First, we create a flier with the names, job titles, and companies of the panelists and make sure to display "Free Food" in bold letters on all materials. We also ask professors in our department to promote the event during classes. Further, we created a website that allows us to inform potential participants about the event through emails. We send an email and request students RSVP with name, email address, and academic program. We also encourage them to join our club via a form on the website. Finally, we send reminders to students before the event.

We distribute the flier and RSVP link by connecting with program directors and asking them to send an email to their students. We have had students at all levels, backgrounds, and programs attend.

When it comes time to prepare for the panel, we collect questions from students and add general questions that will most benefit those attending. We email these questions to the panelists so they can prepare beforehand. Examples of questions we have asked the panel include the following:

> What are some of the most challenging/rewarding aspects of your job?
>
> What is the most important advice you would give from your experiences?
>
> How did you prepare during your bachelor's/master's for the job search?
>
> What advice would you give to students on the job search?

Students can ask questions at any time during the session. Most importantly, we leave ample time for students to interact one-on-one with the professionals after the event. Also, when the panel is over, we collect feedback from students so we can improve future sessions.

The panels have been supported by department faculty and staff, who have provided parking and helped book the conference rooms. Because the panels provide a platform for sharing experiences between students and professionals, they are popular. We feel lucky to have had the opportunity to connect professionals with students at our university and develop a statistics and data science community in the Cincinnati area. ■

**MORE ONLINE**
Interested in starting a student chapter? Visit *www.amstat.org/ASA/Membership/Student-Chapters.aspx*.

**Xiaorui (Jeremy) Zhu** is a PhD candidate at the University of Cincinnati Lindner College of Business majoring in business analytics. His research interests include high-dimensional statistics, machine learning, finance, relevant applications, and creativity. He is the founder of an algorithm-driven company in China called AirlOne Tech (*www.AirlOne.science*).

**Zhaohu (Jonathan) Fan** is a PhD student majoring in business analytics at the University of Cincinnati Lindner College of Business. His research interests include meta-analysis and discrete data analysis. Driven by his strong interest in statistical applications in business and industry, Fan has been actively involved in consulting projects for health care and insurance companies.

**Brittany Green** is a PhD candidate majoring in business analytics at the University of Cincinnati Lindner College of Business. Her research focuses on developing new statistical and machine learning methodologies for complex data with dependence over time and applying cutting-edge methods to business and health applications.


# Success LOOKS LIKE WSDS 2019

Donna LaLonde, WSDS Executive Committee

**WSDS 2019 Planning Committee Members**

Dalene Stangl, Carnegie Mellon University

Saki Kinney, RTI and Committee on Women in Statistics

Stephanie Hicks, The Johns Hopkins University and Committee on Women in Statistics

Nicole Lazar, University of Georgia and Caucus for Women in Statistics

Shili Lin, The Ohio State University and Caucus for Women in Statistics

Amarjot Kaur, Merck and ASA Board of Directors

Christina Link, ASA Meetings Department

Photos by Olivia Brown/ ASA

ZigZag (*https://zigzagpod.com*) is one of my favorite podcasts. While catching up on recent episodes, I realized it was also the theme that emerged for me from the 2019 Women in Statistics and Data Science Conference. From the plenary presentations, concurrent sessions, and informal conversations throughout the conference, it was reinforced that productive and fulfilling research and career opportunities often do not follow straight line trajectories.

This year, we opened the conference with a plenary panel. Wendy Martinez, director of the Bureau of Labor Statistics Mathematical Research Center, served as moderator. She was joined by Randi Garcia, assistant professor at Smith College; Leslie McClure, chair and professor at Drexel University; Sastry Pantula, dean of the California State University, San Bernardino, College of Natural Sciences; and Dalene Stangl, professor emerita at Carnegie Mellon University. The panel considered questions related to creating and sustaining a respectful and inclusive community. Hearing a variety of voices both from the panel and the audience, we considered many paths to this goal and reinforced that there are opportunities for all of us to contribute.

My "zigzag" theory was affirmed by the plenary address given by Dionne Price, director of the US Federal Drug Administration Division of Biometrics IV. During her talk, titled "Women in Statistics and Data Science: Honor the Past,

Marie Ozanne from the University of Iowa discusses her poster, "Bayesian Compartmental Model for an Infectious Disease with Multiple Infectious States."

Yiqi Tang (Annie) from NC State University enjoys one of the poster sessions.

Celebrate the Present, and Envision the Future," Price shared examples from her career journey. She offered the advice "get outside your comfort zone."

Later that day, Elizabeth Thompson, professor emerita at the University of Washington, gave a plenary talk, titled "The True Success Is the Journey: A Career of Research and Education in Statistical Science," in which she shared insights gained over her career. On Saturday, Gabriela de Queiroz, senior engineering and data science manager at IBM, presented the final plenary.

Many of us who attended WSDS 2017 were delighted when de Queiroz acknowledged the inspiration for her talk came from a talk given by Donna Brogan at that conference. During her talk, "I Wish I Could: Taking Charge of Your Future and Path," de Queiroz shared her career journey reinforcing that success does not follow a linear path.

Again this year, the formal program was complemented by participant-organized walks, lunches, and dinners. For example, around 20 folks gathered for lunch Friday to continue the discussion on diversity and inclusion. In addition to enjoying an excellent Indian food buffet, the group generated many ideas. Watch for announcements about new initiatives and opportunities to be involved.

We also had a WSDS Data Challenge in which teams explored data to gain insights and contribute to the public awareness of how to spot disinformation.

Back to my podcast listening, Episode 12 was titled, "We're Rethinking What Success Looks Like." Due in large part to the hard work of the planning committee and the amazing presenters and participants, success—for me—looks like WSDS 2019, and I'm looking forward to WSDS 2020. Please reach out to me at *donnal@amstat.org* if you have suggestions or ideas for next year. ■

Scarlett Bellamy from Drexel University gives her talk, "Health Disparities: Women in Statistics Making a Difference."

Monica Ahrens from The University of Iowa stops for a smile during the Opening Mixer and Poster Session 1.

Kayoung Park from Old Dominion University explains her speed session poster, "A Nonparametric Approach to Evaluating the Point of Treatment Time-Lag Effect."

Plenary panel members for "Creating and Sustaining Respectful and Inclusive Community" include (from left) Donna LaLonde, Wendy Martinez, Randi Garcia, Sastry Pantula, Dalene Stangl, and Leslie McClure.

# Opportunities Abound for JSM 2020 Participation

David Banks, 2020 JSM Program Chair

Philadelphia

I look forward to seeing all the statisticians and data scientists in Philadelphia next year at the 2020 Joint Statistical Meetings. The meeting theme, "Everyone Counts: Data for the Public Good," underscores the positive and essential role of good data and good analysis in policymaking. Our profession's leadership and participation are critical for our future, be it in business, government, or education. Statisticians have a direct responsibility to help make the world better.

**MORE ONLINE**
To be part of the JSM program, visit *ww2.amstat.org/meetings/jsm/2020/beontheprogram.cfm.*

The JSM 2020 Program Committee has finished with the hard task of selecting the invited sessions; we shall have nearly 200 of these. There is something there for everyone, and we had more highly qualified submissions than we could allocate. Some excellent proposals were not selected, but that is a much better problem than the converse. Some of the key themes include data science, big data, and ethical use of data. And the application areas are wonderfully broad, from astrostatistics to cybersecurity to genomics to forensic science to extreme weather events.

There are still opportunities to have stunningly good contributed sessions, as well as other opportunities to share your work (see *ww2.amstat.org/meetings/jsm/2020/beontheprogram.cfm*). Contributed sessions, speed sessions, and poster sessions are all excellent ways to participate and let your teachers, students, and friends learn about your most recent achievements.

For years, JSM has been perfecting its culture of poster presentations. The 2019 meetings in Denver, with posters collocated with the EXPO, was outstanding. It created a busy and enticing atmosphere and drew larger crowds than I have seen at any previous JSM, so I strongly encourage everyone to consider presenting in a speed or poster session.

Three avenues for contributing to the JSM 2020 program include the following:

## Contributed Sessions

The most common JSM session is a contributed session, which typically consists of seven participants, each speaking for 15 minutes. The brevity of these talks can create a high-energy experience, which is even more exciting when all the talks address features of the same application area or methodology.

## Speed Sessions

Speed sessions are even more intense. They allow one to give an electronic poster (e-poster) presentation, which enables video and other special effects. Speed session presenters give a four-minute oral advertisement for a later poster presentation (think of it as a slow elevator pitch). These oral presentations are bundled in sets of 20, with a five-minute break in the middle. This is followed later by the e-poster phase, which lasts 45 minutes. We try hard to cluster speed session posters by topic to muster a large and focused audience.

Here are some tips, based on experience with previous speed sessions:

- The oral component should lure people. Don't try to be too detailed. A touch of mystery can be attractive. Give the big picture view. And a little humor helps.
- E-posters can include software demonstrations, analysis animations, videos, and interactive statistical graphics or dashboards. Take advantage of the versatility of the medium. Don't think in terms of a static poster. Be modern and daring.
- Note that you don't need to pay for poster printing, nor do you have the hassle of transporting a poster in the overhead compartment of an airplane, when you participate in an e-poster session.

## Poster Sessions

And we still have the traditional poster sessions, which display printed posters attached to backing boards at the designated site.

Elizabeth Mannshardt and Emily Griffith got the North Carolina Chapter to hold "recycled poster" sessions at various venues (mostly bars) in and around the Research Triangle. I mention this because everyone should have a poster ready to go;

## Call for Volunteers: Session Chairs

Each JSM session needs a chair. The job includes contacting speakers with session information before JSM and introducing speakers and managing time during the session. The session chair position is a great way for new researchers to build a professional network and get involved with JSM (and one can mention this service on one's CV). To volunteer, identify a section or society of interest and contact the program committee member (see *ww2.amstat.org/meetings/jsm/2020/programcommittee.cfm* for a list).

you never know when it will be handy. And it is a useful exercise to think about how best to frame one's work within the constraints of a poster board.

### Abstract Submission

To contribute to the JSM 2020 program in any of these three ways, submit an abstract and title online (*ww2.amstat.org/meetings/jsm/2020/submissions.cfm*) by February 4, 2020. For organizational reasons, speakers are required to register for JSM when they submit their abstracts. As part of that submission, speakers must also indicate the ASA section or JSM partner society most closely associated with the topic of their presentation. The system will be reopened for abstract editing from April 1–18, 2020.

JSM 2020 is a great opportunity to grow your career, meet leaders in the field, and find out where the profession is going. JSM's success depends upon its participants. I am open to any feedback through email at *dlbanks@duke.edu*. ■

# UNDERGRADUATE • GRADUATE • PHD INTERNSHIPS

The following companies are looking for 2020 interns. From this list, you will see there is something for everyone—from positions at pharmaceutical companies to a summer spent studying at media organizations nationwide. If you are interested in improving your programming techniques, making connections, or honing your data analysis skills, apply for one of these opportunities.

If your organization would like to include an internship opportunity on our website, complete the form at *http://bit.ly/2CBAzyH*. Interested students will send a letter of inquiry and résumé directly to the contact and location you list.

## AbbVie, Inc.

*North Chicago, Illinois*

**Number of Positions:** Multiple

**Type of Student:** PhD candidates in statistics or biostatistics

**Deadline:** January 31, 2020

In this 10–12-week summer program, interns will work on statistical research topics related to the pharmaceutical industry such as deep learning, historical data borrowing, missing data imputation, and survival analysis. Interns will present project/assignment results and learnings to department management and the broader team at the conclusion of the internship.

**Apply** at *http://bit.ly/2O1lHO6* (requisition #1906923).

## Amgen

*Thousand Oaks, California*

**Number of Positions:** 3

**Type of Student:** Graduate, pursuing a PhD in biostatistics, statistics, mathematics

**Deadline:** January 31, 2020

Amgen's 10–12-week internship program provides the opportunity for executive and social networking events and participation in community volunteer projects while providing competitive compensation. A transportation allowance will be provided for eligible candidates.

This position within the Center for Design and Analysis (CfDA) will work closely with a senior-level statistician or data scientist on topics related to the design and analysis of clinical trials and/or nonclinical research.

Only candidates who apply via *http://careers.amgen.com* will be considered. Search for Keyword 85845.

**Contact:** Natalie Mirzaian / Christine Parada, *universityrelations@amgen.com*

## Astellas Pharma, Inc

*Northbrook, Illinois*

**Number of Positions:** 2

**Type of Student:** PhD candidate in statistics or related disciplines

**Deadline:** January 31, 2020

Full-time internships are available in the summer for 10–12 weeks. Successful candidates will work closely with a senior-level

**MORE ONLINE**
Find full descriptions for these internships on STAT*tr@k* at *https://stattrak.amstat.org/2019/12/01/2020-internship-listings.*

statistician on topics related to the design and analysis of clinical trials and statistical research.

Send CV, cover letter, and a letter of recommendation.

**Contact:** *Biostat.Intern@Astellas.com*

## Battelle

*Columbus, Ohio*

**Number of Positions:** 4

**Type of Student:** Bachelor's and master's

**Deadline:** December 23, 2019

Data Science Intern: *http://bit.ly/2NIneei*

**Contact:** Juli Garn, (614)-424-7537, *garn@battelle.org*

## Boehringer Ingelheim

*Ridgefield, Connecticut*

**Number of Positions:** Up to 5

**Type of Student:** Graduate student in fields related to statistics, biostatistics, data science, computer science, epidemiology, public health, or mathematics with good academic standing

**Deadline:** January 31, 2020

As a biostatistics intern, you will work with a senior-level statistician on a statistical research project related to the pharmaceutical industry and clinical trials. Potential topics may include survival analysis, Bayesian methods, and dose-finding, with applications to oncology, immunology, cardiology, respiratory, or central nervous system disorders.

**Apply** at *http://bit.ly/32HPCRK*.

**Contact:** Wansuk Choi (*wansuk.choi@boehringer-ingelheim.com*) and Jianan Hui, (*jianan.hui@boehringer-ingelheim.com*), Boehringer Ingelheim Pharmaceuticals, Inc., 900 Ridgebury Road, Ridgefield, CT 06877.

## Biogen

*Cambridge, Massachusetts*

**Number of Positions:** 4

**Type of Student:** PhD

**Deadline:** January 15, 2020

The biostatistics department at Biogen will have internship positions available for approximately 12 weeks in the summer of 2020. The interns will work with one or multiple senior-level statisticians on research projects closely related to clinical trials or nonclinical research. They will also have the opportunity to be exposed to the drug development process.

**Contact:** Wenting Wang, 225 Binney St., Cambridge, MA 02142; (617) 914-1155; *DL-BiostatsIntern@biogen.com*

## The D. E. Shaw Group

*New York*

**Number of Positions:** 1

**Type of Student:** All levels

**Deadline:** Rolling

The goal of our summer internship program is to expose talented individuals to the projects and environment associated with full-time work in quantitative analysis and software development. Interns interact with various trading groups and gain valuable work experience while demonstrating their skills on a variety of real-world projects. Working closely with quants, developers, and other senior staff as mentors, interns can expect an environment conducive to learning.

**Contact:** Patricia Wu, (212) 478-0000, *Patricia.Wu@deshaw.com*

## Eli Lilly and Company

*Indianapolis, Indiana*

**Number of Positions:** Multiple

**Type of Student:** Candidates are enrolled in a graduate-level curriculum leading to a PhD or master's in statistics or biostatistics. PhD students are required to have completed at least three years of graduate work by May 2020. Master's students must have completed at least one year of graduate work by May 2020.

**Deadline:** January 15, 2020

The internships start in either May or June and last 12 weeks. We will provide you with practical experience and give you the opportunity to build your understanding of the pharmaceutical industry and Eli Lilly and Company. Successful candidates will be assigned specific projects to work on under the guidance of a Lilly statistician or statistical analyst (mentor).

PhD students should apply at *http://bit.ly/2CG36CU*.

Master's students should apply at *http://bit.ly/34VG5bw*.

**Contact:** Alexandria Pernell, Global Recruiting and Staffing, *APernell@lilly.com*

## The Emmes Company, LLC

*Rockville, Maryland*

**Number of Positions:** 5–8

**Type of Student:** MS or PhD in biostatistics

**Deadline:** March 31, 2020

A biostatistics intern will work closely with biostatisticians on biomedical research projects across a variety of disease areas. Interns meet with epidemiologists, project coordinators, and biomedical investigators and contribute to the design and analysis of clinical research projects.

For immediate consideration, submit your résumé and apply directly through the company website at *https://secure.emmes.com/emmesweb*.

**Contact:** Kate Salava, (301) 251-1161; (301) 576-7114 (fax); *ksalava@emmes.com*

## Office of Biostatistics, CDER, FDA

*Silver Spring, Maryland*

**Number of Positions:** Multiple

**Type of Student:** Graduate students in statistics or biostatistics; completion of doctoral prequalifying exams preferred

**Deadline:** March 13, 2020, with rolling offers

We anticipate having multiple internship positions available for advanced PhD graduate students in statistics or biostatistics from May 26 through August 28, 2020, to engage in research projects on topics relevant to Office of Biostatistics (OB) scientific needs. Interns will gain hands-on experience with regulatory research projects under the guidance of an expert OB mentor, using actual data to address real problems in a stimulating, collaborative, and supportive environment.

**Contact:** Send CV and cover letter to *CDER-OTS-OB-Recruitment@fda.hhs.gov* with APPLICATION ORISE 2020 in the subject line. If you have a question, use QUESTION ORISE 2020 as the subject.

## Genentech, Inc.

*South San Francisco, California*

**Number of Positions:** 4–6

**Type of Student:** Graduate, pursuing PhD in statistics, biostatistics, or related field

**Deadline:** January 10, 2020. Applications submitted by December 15, 2019, will receive priority review.

The biostatistics summer interns will work for 10–12 weeks under the supervision of experienced biostatisticians on theoretical or applied problems with direct relevance to ongoing clinical or nonclinical drug development in diverse therapeutic areas such as oncology, immunology, infectious disease, ophthalmology, and neuroscience. The specific topics may cover research problems from translational research to late-stage clinical trials and post-marketing evaluations.

**Apply** online at *https://go.gene.com/biostatsummerintern2020*.

**Contact:** *gnebiostatsummerintern@gene.com*

## GlaxoSmithKline

*Upper Providence, Pennsylvania*

**Number of Positions:** 2

**Type of Student:** MSc, PhD

**Deadline:** Mid-November for January hiring; mid-April for June hiring

CMC Statistics, within the biostatistics division of GSK, is an internal consulting group that provides statistical consulting support to nonclinical research and development. The co-op student will work under the supervision of the statisticians in CMC Statistics and have the opportunity to do the following:

- Advise on design, sample size, and other aspects of statistical relevance in the planning of studies
- Provide statistical analysis, reporting, and interpretation of results of studies
- Provide statistical computing programs for use either within CMC Statistics or by other R&D staff

**To apply**, visit *http://bit.ly/2NFOCtj*.

## Google

*Bay Area, California; New York, New York; Los Angeles, California*

**Deadline:** January 24, 2020

Requirements:

- Currently pursuing a PhD in a quantitative discipline (statistics, biostatistics, computer science, applied mathematics, operations research, economics) or another discipline involving experimental design and quantitative analysis of data
- Experience using technology to work with data sets such as scripting, Python, or statistical software (R, SAS, or similar)
- Experience with statistical data analysis such as linear models, multivariate analysis, stochastic models, and sampling methods

**Apply** at *Google.com/students* January 6–24, 2020.

## The Institute for Defense Analyses

*Alexandria, Virginia, and Washington, DC*

**Number of Positions:** 22

**Type of Student:** Undergraduates, graduate students, and PhDs

**Deadline:** January 4, 2020

The Institute for Defense Analyses' (IDA) Summer Associate Program provides students with a unique opportunity to use their quantitative and analytic skills to work on challenging real-world national security issues. Positions are available with a variety of foci. Projects from past years have included functional data analysis, Bayesian approaches to reliability estimation, and statistics in science policy.

To learn more and apply for this opportunity, visit *http://bit.ly/2O8ysaC*.

**Contact:** Caroline O'Rourke, 4850 Mark Center Drive, Alexandria, VA 22311; (703) 845-2012; *corourke@ida.org*

## Janssen R&D, a Division of Johnson & Johnson

*Spring House, Pennsylvania; Titusville, New Jersey; Raritan, New Jersey; La Jolla, California*

**MORE ONLINE**
Find full descriptions for these internships on STAT*tr@k* at *https://stattrak.amstat.org/2019/12/01/2020-internship-listings.*

**MORE ONLINE**
Find full descriptions for these internships on STAT*tr@k* at *https://stattrak.amstat.org/2019/12/01/2020-internship-listings.*

**Number of Positions:** 8

**Type of Student:** PhD candidate

**Deadline:** February 15, 2020

Summer internships are available for students working toward a PhD in statistics, biostatistics, or a related discipline. Students will have the opportunity to work with practicing statisticians and learn about statistical applications specific to clinical or nonclinical pharmaceutical industry settings. Our teams benefit from the student's academic training and, in turn, contribute to the professional development of the student and have a first-hand opportunity to evaluate the student's potential for future employment.

Visit *https://jobs.jnj.com/job* for a full description and to apply, using the search terms "intern statistics" or "SDS" (without the quote marks), which should provide a listing that includes the summer intern item.

## John Deere

*Moline, Ilinois*

**Number of Positions:** 20

**Type of Student:** Undergraduate, graduate, or PhD

**Deadline:** February 1, 2020

The data and analytics intern program is for students who have completed at least one year of their bachelor's or master's program and are looking for a 2–3-month summer internship. Our analytic internship will provide an opportunity for you to apply your data science skills to business problems within a specific department and functional area. Opportunities exist across varied functional areas such as financial services, information technology, precision agriculture, customer and product support, supply management, sales and marketing, order fulfillment, and engineering.

**Contact:** Megan Osterberg, *jdjobs@johndeere.com*

## The Lubrizol Corporation

*Wickliffe, Ohio*

**Number of Positions:** Multiple

**Type of Student:** Bachelor's, master's, PhD

**Deadline:** February 2, 2020

Operating like a start-up company, but with the backing of a large corporation, the statistics and data analytics team is charged with creating systems that enable highly effective product development via virtual experimentation, optimization, and knowledge discovery. In addition, the team provides data science consulting services to the Lubrizol technical community throughout the world. The project work depends on the skills/interests of the intern and the current needs of the department.

**Apply** for internship positions at *https://lubrizol.jobs*.

**Contact:** Allison Rajakumar, 29400 Lakeland Blvd., Wickliffe, OH 44092; (440) 347-4679; *Allison.Rajakumar@Lubrizol.com*

## Mayo Clinic

*Rochester, Minnesota*

**Number of Positions:** 15–18

**Type of Student:** Undergraduate, graduate, PhD

**Deadline:** January 15, 2020

Interns will work with statisticians, bioinformaticists, and clinical investigators on research projects in areas such as clinical trials, statistical genetics, and bioinformatics. Experience with SAS and/or R preferred. Whether an individual applicant will be offered a position will depend on their qualifications, our need and available funding, and the number of applicants.

To apply, submit an unofficial transcript, résumé, and cover letter at *https://mayocl.in/2CD5oTr*. Search keyword "Biostats" (statistical internship) or "Intern-IS" (informatics internship) and our current openings will be available.

**Contact:** Bud Harris, Department of Human Resources, Mayo Clinic, 200 First St. SW, Rochester, MN 55905; (480) 342-3493; (507) 284-1445 (fax); *Harris.Bud@mayo.edu*

## Memorial Sloan Kettering Cancer Center

*New York, New York*

**Number of Positions:** Multiple

**Type of Student:** Undergraduate

**Deadline:** January 17, 2020, at 5 p.m. EST

Students will participate in individual research projects and receive exposure to methods in biostatistics, epidemiology, and health outcomes research from June 1 to August 7, 2020. Through the program, students will advance their quantitative skills and knowledge, as well as their understanding of options for graduate study and careers in these areas. Student research projects will be individualized and address topics such as survival analysis, prediction modeling, cancer epidemiology, genetics and genomics, quality measurement, and disparities in cancer care and outcomes.

**To apply**, visit *www.mskcc.org/qsure*.

**Contact:** 485 Lexington Ave., 2nd Floor, New York, NY 10017; (646) 888-8156; *bstQSURE@mskcc.org*

## Mental Health in the Country of Ukraine

*Kiev, Ukraine (two weeks); Sioux Center, IA (eight weeks)*

**Number of Positions**: 9

**Type of Student:** Undergraduate

**Deadline:** January 31, 2020

Successful applicants will work with a team of other undergraduate students on interdisciplinary research projects investigating a variety of research questions about this developing country, leading to publication in peer-reviewed journals and presentations at regional and national conferences.

For application and additional information, visit *www.dordt.edu/events/ukraine-reu*.

**Contact:** Emily Mettler, Department of Mathematics and Statistics, Dordt University, 498 4th Ave. NE, Sioux Center, IA 51250; (712) 722-6264; *emily.mettler@dordt.edu*

## Merck Research Laboratories

*Rahway, New Jersey; Kenilworth New Jersey; Upper Gwynedd, Pennsylvania; West Point Pennsylvania*

**Number of Positions:** 15

**Type of Student:** Graduate

**Deadline:** Rolling

The Biostatistics and Research Decision Sciences (BARDS) Department has approximately 15 internships in preclinical biostatistics and clinical biostatistics for full-time students pursuing an MS or PhD degree in statistics or biostatistics. In these internships, you will work closely with an experienced pharmaceutical industry statistician to perform statistical analysis of data from and/or statistical research related to basic drug research, clinical pharmacology, drug and vaccine development, biomarker development, or pharmacogenomics.

To be considered for these positions, visit *www.merck.com/careers* to create a profile and submit your résumé. Résumés will not be accepted via email.

## National Cancer Institute

*Rockville, Maryland*

**Number of Positions:** 2

**Type of Student:** Flexible

**Deadline:** Three months before you want to start

This is an unpaid internship. To compensate, we try to make the experience as educational and rewarding as possible. There is no clerical work. Rather, the intern engages in high-level methodological research in areas of substantial importance in the design and analysis of randomized clinical trials. Recently, we have focused mostly (but not exclusively) on the nexus among randomization methods, allocation concealment, and selection bias. Please familiarize yourself with this area of research before making contact.

**Contact:** Vance Berger, *vance917@gmail.com*

## Netflix *(Data Science and Engineering)*

*Los Gatos, California, and Los Angeles, California*

**Number of Positions:** Approximately 8

**Type of Student:** Post-qual PhD students preferred

**Deadline:** Interviews will begin in early January 2020

We are looking for a small number of summer fellows with the following qualifications:

- PhD student in a STEM field engaged in ongoing research at an accredited university and eligible to work in the USA
- Prior applied experience with statistics or machine learning
- Experienced coder in at least one language (e.g., R, Python, Java, Scala, C++)
- Curious, self-motivated, and excited about solving open-ended challenges at Netflix
- Great oral and written communication skills
- (Preferred) Comfortable writing SQL queries
- (Preferred) Experience with version control (e.g., Git)

Learn more about our work at *research.netflix.com*. Netflix is a unique place to work, and we live by our values, so it's worth learning more about our culture at *jobs.netflix.com/culture*.

**Contact:** *dse-interns-info@netflix.com*

## Novartis

*East Hanover, New Jersey; Cambridge, Massachusetts; Fort Worth, Texas; Princeton, New Jersey*

**Number of Positions:** Multiple

**Type of Student:** Graduate, PhD

**Deadline:** January 31, 2020

Interns will work on statistics, pharmacometrics, or data science projects to design and analyze clinical trials and/or perform relevant quantitative research under the guidance of experienced quantitative scientists. Various real-world problems will give interns hands-on exposure to the early and late phases of drug development across therapeutic areas such as oncology, cardiology, immunology, neurology, ophthalmology, and respiratory care. Potential topics include machine learning, survival analyses, causal

inference, Bayesian statistics, disease progression modeling, and/or PK/PD modeling. Interns will also attend seminars and other activities to enhance their understanding of the drug development process. There will be opportunities for interns to present their project results to quantitative scientists and other key stakeholders.

**Contact:** Send your CV to *internships.analytics@novartis.com*.

## Pfizer Inc.

*La Jolla, California; Boulder, Colorado; Groton, Connecticut; Collegeville, Pennsylvania; Cambridge, Massachusetts; New York, New York; Andover, Massachusetts; Pearl River, New York*

**Number of Positions:** 15

**Type of Student:** Graduate student in statistics, biostatistics, or related field

**Deadline:** January 31, 2020

The internship will consist of up to 480 hours of work, commencing as early as April and ending as late as December. The intern's project will be biopharmaceutically oriented, with one-on-one supervision by a senior staff statistician. The work will be a hands-on learning experience focusing on current project needs and will likely involve use of SAS, R, or other statistical software. As part of the internship program, the intern will prepare a written report and brief presentation summarizing the work and forming a permanent record of the intern's efforts.

**To apply,** send an application to *xun.lin@pfizer.com*.

**Contact:** Xun Lin, Pfizer Inc., 10555 Science Center Drive, San Diego, CA 92121

## QST Consultations, LTD

*Allendale, Michigan*

**Number of Positions:** 2 +

**Type of Student:** Master's or PhD in statistics, biostatistics, or related field

**Deadline:** January 17, 2020

The internship is a 12-week program starting May 25, 2020. The program is primarily SAS based. The intern will be part of the statistical services department and become familiar with the CDISC data structure, as well as be involved in the programming of outputs for our clients. These outputs, including tables and listings, will be part of a clinical study report our clients will submit to regulatory authorities. Send a CV and cover letter to apply.

**Contact:** Rhonda Pardue, QST Consultations, LTD, 11275 Edgewater Drive, Allendale, MI 49401; (616) 892-3730; *rpardue@qstconsultations.com*

## Sanofi US, Inc.

*Bridgewater, New Jersey; Cambridge, Massachusetts*

**Number of Positions:** Multiple

**Type of Student:** PhD candidate in statistics or biostatistics

**Deadline:** March 1, 2020

Successful candidates will work on design and analysis of early- and late-phase clinical trials and statistical methodology research under the supervision of senior-level statisticians.

Candidates must have completed at least two years of graduate coursework and be working on a dissertation toward a PhD in statistics or biostatistics. Requirements include effective oral and written communication skills and knowledge of SAS and/or R. Python is a plus.

Email CV and (un)official graduate transcript to Xiaodong Luo.

**Contact:** Xiaodong Luo, Department of Biostatistics and Programming, Sanofi US Inc., 55 Corporate Drive, Bridgewater, NJ 08807; *xiaodong.luo@sanofi.com*

## SAS Institute, Inc.

*Cary, North Carolina*

**Number of Positions:** Multiple

**Type of Student:** PhD or Master's students

**Deadline:** Starting now on a rolling basis (before January 31, 2020)

As an intern in the statistics area, you will contribute to research, numerical validation and testing, and documentation. The program provides an excellent opportunity to explore software development as a career choice.

Information and application details can be found at *http://bit.ly/2QfOcLN*.

**Contact:** Fang Chen, R4250 SAS Campus Drive, Cary, NC 27513; *fangk.chen@sas.com*

## Shionogi, Inc.

*Florham Park, New Jersey*

**Number of Positions:** 1

**Type of Student:** Graduate or undergraduate

**Deadline:** February 15, 2020

The intern will work closely with experienced statistics project leaders and trial lead statisticians. The intent is to offer exposure across projects and therapeutic areas regarding the day-to-day job of an industry statistician to demonstrate the opportunities in statistics in the pharmaceutical industry.

**Contact:** Bruce Binkowitz, 300 Campus Drive, Florham Park, NJ 07932; (973) 307 3487; *bruce.binkowitz@shionogi.com*

## Social and Decision Analytics Division, Biocomplexity Institute and Initiative, University of Virginia

*Arlington, VA*

**Number of Positions:** 10+ undergraduate interns and 5+ graduate students

**Type of Student:** Undergraduate students in any discipline and graduate students (MS or PhD) with quantitative/analytical skills enrolled at any US university

**Deadline:** January 31, 2020

The Social and Decision Analytics Division (SDAD) is seeking applications for graduate fellows and undergraduate interns for its Data Science for Public Good (DSPG) program. The DSPG program will run for 11 weeks (May 26 – August 7) for graduate fellows and 10 weeks (June 1 – August 7) for undergraduate interns. Fellows and interns will work in teams collaborating with postdoctoral associates and research faculty from SDAD and project stakeholders.

**To apply,** submit an application online at *https://uva.wd1.myworkdayjobs.com/UVAJobs* and search for requisition number R0010930. Attach a current CV/résumé, transcript, and cover letter with your relevant experience and interest in the position. Please have three confidential letters of reference sent to *dspg2020@virginia.edu*.

**Contact:** Gizem Korkmaz, Social and Decision Analytics Division, Biocomplexity Institute and Initiative – University of Virginia, 1100 Wilson Blvd., Office #2910, Arlington, VA 22209; *gkorkmaz@virginia.edu*

## StataCorp, LLC

*College Station, Texas*

**Number of Positions:** 1–3

**Type of Student:** PhD student in statistics, biostatistics, econometrics, or a closely related field

**Deadline:** January 20, 2020

Candidates must have completed at least three years of graduate work; have good statistical, technical writing, and communication skills; and have experience programming in Stata, C/C++, Java, or other statistical and programming languages. Research experience in Bayesian analysis, missing-data methods, multilevel modeling, nonparametric statistics, clinical trials, survival analysis, causal inference, time-series analysis, or panel-data analysis is desirable.

**Apply** at *stata.com/internships*. StataCorp LLC is an affirmative action employer—minorities/females/veterans/disability.

## Summer Institute for Research Education in Biostatistics (SIBS)

*Up to seven sites within the US*

**Number of Positions:** Up to 25 at each site

**Type of Student:** Undergraduates majoring in mathematics, statistics, biology, or other science who have interest in quantitative methods. Those who already have a baccalaureate degree are eligible to apply, but priority will be given to undergraduates at the time of application. US citizenship or permanent resident status is required.

**Deadline:** Early March 2020 or as specified by individual sites

The program will be offered at six to seven sites in the summer of 2020. Although each program will be different, all will focus on providing participants with an intensive introduction to biostatistical principles and methodologies and the essential role of biostatistics in health sciences research, including biomedical big data. Participants will enjoy instruction and lectures by recognized experts in the field; meet practicing biostatisticians, epidemiologists, and statistical geneticists and genomicists; and gain real-world experience working with data from internationally recognized studies.

Information about each program is available at *www.nhlbi.nih.gov/grants-and-training/summer-institute-biostatistics*.

## Takeda Pharmaceuticals, Inc.

*Cambridge, MA*

**Number of Positions:** Multiple

**Type of Student:** PhD candidates in biostatistics, statistics, or related disciplines

**Deadline:** March 15, 2020

Interns will work closely with experienced industry statisticians on topics related to big data, artificial intelligence, innovative design and analysis of clinical trials, and/or preclinical research.

**To apply,** email your résumé and cover letter to *biostatistics.intern@takeda.com*.

**Contact:** Takeda SQS Intern Coordinator, (617)374-7754 or *biostatistics.intern@takeda.com*

## Thomas Jefferson University Division of Biostatistics

*Philadelphia, Pennsylvania*

**Number of Positions:** 3

**Type of Student:** Undergraduate (junior or senior preferred), graduate (MS or PhD)

**MORE ONLINE**
Find full descriptions for these internships on STAT*tr@k* at *https://stattrak.amstat.org/2019/12/01/2020-internship-listings.*

**MORE ONLINE**
Find full descriptions for these internships on STAT*tr@k* at *https://stattrak.amstat.org/2019/12/01/2020-internship-listings.*

**Deadline:** February 15, 2020

Jefferson's division of biostatistics in the department of pharmacology and experimental therapeutics will sponsor up to three students as summer interns, who will do the following:

- Research statistical topics relevant to biomedical research
- Apply statistical thinking to biomedical research problems
- Analyze real-world biomedical data and interpret the results
- Develop statistical programming skills in SAS, R, and other languages
- Develop and practice communication of statistical methods and results through written and oral presentations
- Receive guidance and mentoring regarding their future studies and career trajectory

**Apply** at *https://jeffline.jefferson.edu/education/programs/biostatistics_s*i.

**Contact:** Gloria Elnitsky, (215) 955-9079; *Gloria.Elnitsky@jefferson.edu*

## Travelers

*Hartford, Connecticut, and St. Paul, Minnesota*

**Number of Positions:** 30

**Type of Student:** Graduate (MS or PhD) in mathematics, statistics, or data science

**Deadline:** February 1, 2020

Travelers Advanced Analytics Internship Program provides qualified students with an excellent opportunity to gain first-hand business experience, receive valuable on-the-job training, and learn about the many advanced analytic and data science positions available in the insurance industry. Interns will work on challenging assignments that will use and develop their technical and overall business skills.

**Apply** for job posting 22429BR at *www.travelers.com/careers*.

**Contact:** Frank Malzone, *FMALZONE@travelers.com*

## Two Sigma

*New York, New York*

**Type of Student:** Bachelor's, master's, and PhDs

**Deadline:** March 1, 2020

The internship program lasts 10 weeks in the summer and takes place at our Soho-based, New York City office. You will partner with an assigned mentor and work on a single project during the course of your time here, which will culminate in a final presentation.

**Apply** at *http://bit.ly/2O3Dg1b*.

**Contact:** M&T Campus Recruiting, *m&tcampus@twosigma.com*

## Undergraduate Research Program in Statistical Genetics

*Sioux Center, Iowa*

**Number of Positions:** 6

**Type of Student:** Undergraduate

**Deadline:** January 31, 2020

Successful applicants will work with a team of other undergraduate students on cutting-edge problems in statistical genetics leading to publication in peer-reviewed journals and presentations at regional and national conferences. Participants will receive a $4,000 stipend for the eight-week program, which runs from June 1 to July 24, 2020. Free apartment-style housing and funds for travel to/from Sioux Center, Iowa, will be provided. An application and additional information can be found at *www.dordt.edu/statgen*.

**Contact:** Nathan Tintle, Dordt University, Department of Mathematics and Statistics, Sioux Center, IA 51250; (712) 722-6264; *nathan.tintle@dordt.edu*

## The University of North Carolina Center for AIDS Research

*Chapel Hill, North Carolina*

**Number of Positions:** 1

**Type of Student:** Undergraduates only (including 2020 graduating seniors)

**Deadline:** March 4, 2020 (rolling admission)

The Biostatistics Core at UNC Center for AIDS Research is seeking a part-time paid summer undergraduate intern (~20+ hours/week). The core helps design studies, analyze data, and advance statistical methods for HIV research at UNC and internationally. As a summer intern, you will have the opportunity to aid in statistical analysis and gain valuable experience in multidisciplinary research.

**Contact:** Katie R. Mollan, Center for AIDS Research, The University of North Carolina at Chapel Hill, 3126 McGavran-Greenberg Hall, CB #7420; (919) 966-8421 (email preferred); *kmollan@unc.edu* ■

## Jeanne E. Griffith Mentoring Award

Nominations for the 2020 Jeanne E. Griffith Mentoring Award will be accepted until March 22. The award recipient—a supervisor, technical director, team coordinator, or other statistical staff member—will be selected for his or her efforts to support the work and develop the careers of junior staff in the statistical community in federal, state, or local government. Preference will be given to individuals with a track record of mentoring government statisticians. Examples of typical mentoring activities include the following:

- Advising junior staff to help them create career opportunities, networking skills, and contacts for growth and development
- Counseling junior staff and providing resources to help develop their technical writing, analysis, presentation, and organizational skills and knowledge
- Encouraging the growth and career development of junior staff through attendance and oral presentations at meetings with higher-level officials, staff of other agencies, professional associations, training courses, and conferences
- Motivating junior staff and building self-confidence by providing feedback, being a listener when needed, and creating a caring and supportive environment
- Serving as a role model for junior staff through professional expertise; information and insight; the balance of collegial and personal roles; and the inclusion of everyone regardless of rank, race, ethnicity, gender identity, or seniority

The award was established to honor Jeanne E. Griffith, who died in August 2001 after working for more than 25 years in the federal statistical system. Throughout her career, and especially in her latter senior management positions at the National Center for Education Statistics and the National Science Foundation, one of Griffith's highest priorities was to mentor and encourage younger staff at all levels to learn and grow, as well as recognize and seize career opportunities as they came along.

The nomination form and guidelines are available from the Government Statistics Section website (see *https://community.amstat.org/governmentstatisticssection/awards/nominations*).

The award committee will determine the award winner in April. The award will consist of a $1,000 honorarium, citation, and plaque, which will be presented at a ceremony arranged by the cosponsors.

The nomination package must be emailed to ASA Professional Development and Sections and Chapters Manager Rick Peterson at rick@amstat.org or mailed to the Jeanne E. Griffith Mentoring Award Committee c/o The American Statistical Association, 732 N. Washington Street, Alexandria, VA 22314-1943.

Questions about the award can be addressed to Peterson or the chair of the award committee, Bill Mockovak, at *Mockovak.William@bls.gov*. ■

## Mu Sigma Rho

Mu Sigma Rho invites academic institutions to nominate outstanding teaching faculty for the 2020 Mu Sigma Rho William D. Warde Statistics Education Award. The nominee must have evidence of excellence in classroom teaching in the statistics discipline and evidence of a lifetime devotion to statistics education.

Each academic institution is allowed one nomination per year. In the event that more than one nomination is received from a single institution in a year, only the first will be considered. Any college or institution may nominate a potential recipient, regardless of whether the institution has an active Mu Sigma Rho chapter.

Each nomination should include the following:

- Cover letter
- Nominee's curriculum vitae
- Summary of the nominee's teaching and educational activities
- Draft of a citation briefly describing the nominee's accomplishments
- At least three, but no more than six, letters supporting the nomination (at least two of these letters should come from present or former students and at least one should come from a colleague)

If a nominee is not selected for the award, the nomination will remain active for three years after the initial submission, unless the institution chooses to put forward another nominee.

Nominations should be sent to Lisa Kay at *Lisa.Kay@eku.edu* by February 15, 2020. Include all nomination material in a single PDF document.

The recipient of the award will be notified on or before March 15, 2020, and be presented a plaque at JSM 2020 in Philadelphia, Pennsylvania, August 1–6, 2020. Questions regarding this award should be emailed to Kay. ■

**MORE ONLINE**
Deadlines and contact information for all ASA national awards, special lectureships, and COPSS awards can be found online at *magazine.amstat.org/blog/2019/11/01/awards1920.*

PhD student Nancy Murray (left) and Donna Brogan prepare to cut Brogan's birthday cake.

## Donna Brogan

On August 27, 2019, the Rollins School of Public Health (RSPH) Department of Biostatistics and Bioinformatics at Emory University celebrated the 80th birthday of Donna Jean Brogan, professor emerita of biostatistics since her Emory retirement in 2004. Gifts given by colleagues, friends, and family helped endow the annual Donna Jean Brogan Lecture in Biostatistics.

Nancy Murray, a biostatistics doctoral candidate, emceed the celebration. Several people reviewed aspects of Brogan's career, including her contributions to fostering career opportunities for women in statistics (e.g., spearheading the formation of the Caucus for Women in Statistics in 1971). Speakers included John Hanfelt, interim chair of biostatistics and bioinformatics; Murray; Ying Guo, professor of biostatistics; Michael Kutner, professor of biostatistics; Jim Curran, dean of the RSPH; Kathryn Graves, senior associate dean of development and external relations of the RSPH; and Andrea Lane, biostatistics doctoral student. Extemporaneous remarks from previous colleagues and friends followed.

Students and faculty coordinated a membership drive for the Caucus for Women in Statistics in honor of Brogan and the honorary gift of increased membership was presented at the celebration.

Brogan expressed appreciation to her colleagues and friends at the RSPH and thanked them for their role in her enjoyment of a long career in biostatistics. She reminded all that she has retired from Emory (sort of), but not from the biostatistics discipline. She still teaches continuing education courses about design and analysis of complex sample surveys, including two at CDC University in November. And, yes, she still participates in challenge-level square dancing!

**Nicholas Reich,** ASA member and associate professor at the University of Massachusetts – Amherst, will receive up to $3 million in funding over the next five years from the US Centers for Disease Control and Prevention (CDC) to operate a UMass-based CDC Influenza Forecasting Center of Excellence, one of two in the nation.

Reich's flu forecasting collaborative has produced some of the world's most accurate models in recent years and leads a team that will work closely with the CDC, identifying new methods and data sources to sharpen the accuracy and improve communication of seasonal and pandemic flu forecasts.

These new predictive tools could more effectively target the public health response to a potential flu outbreak, helping to determine the timing for flu vaccine campaigns, potential school closures and travel restrictions, and the allocation of medical supplies and antiviral medications.

Reich is aiming to communicate more accessible and user-friendly information to the public, perhaps via a smart phone app. "We want to convey the forecasts in ways that people can understand, as it relates to their everyday lives," Reich said. "If we can communicate the data effectively, we might change behavior."

An app could help people gauge their risk, based on their location and individual characteristics. "Maybe they'll tell grandma not to go to the shopping mall in the next two weeks, or maybe your kid with asthma won't visit the children's museum in Holyoke, where so many kids go to play in the winter," Reich said. "Those are the things I can foresee, where you're making everyday choices with this information."

Read more about the UMass Amherst Center of Excellence at *www.umass.edu/newsoffice/article/cdc-designates-umass-amherst-flu.* ■

**Susan S. Ellenberg** has been appointed interim chair of the department of biostatistics, epidemiology, and informatics (DBEI) at the University of Pennsylvania Perelman School of Medicine as of October 1.

Ellenberg has been a DBEI faculty member since 2004 and holds a secondary appointment in the department of medical ethics and health policy. Prior to her appointment at the university, Ellenberg held several senior-level positions in the federal government. Her research has focused on practical problems and ethical issues in designing, conducting, and analyzing data from clinical trials.

Ellenberg is a fellow of the ASA, Society for Clinical Trials, and American Association for the Advancement of Science. She is also an elected member of the International Statistical Institute and the 2019 recipient of the COPSS F.N. David Award.

Read more about Ellenberg at *www.dbei.med.upenn.edu/bio/susan-s-ellenberg-phd.* ■


# University of Michigan's Undergraduate Big Data Summer Institute Completes Fifth Year

Matthew Zawistowski, University of Michigan Clinical Assistant Professor of Biostatistics and Big Data Summer Institute Assistant Director

The Big Data Summer Institute (BDSI)—a joint effort between the departments of biostatistics, statistics, and computer science at the University of Michigan (UM)—recently completed its fifth year, sending its 2019 cohort of 40 undergraduate students into the brave new world of biostatistics and data science.

BDSI was established in 2015 by the University of Michigan School of Public Health Department of Biostatistics to train the next generation of quantitative scientists by immersing them in cutting-edge research projects at the interface of statistics, computing, and health sciences. Led by founding director Bhramar Mukherjee, the program has been a success. Further, the cohorts have reflected the need to increase diversity in data science; more than half of BDSI participants are females and approximately 17 percent are from under-represented minority groups.

From its inception, BDSI has employed a successful model of T-shaped learning combined with enthusiastic participation from faculty across campus. Students meet for daily morning lectures that provide a broad overview of key concepts and applications in the world of big data. The first couple of weeks establish basic skills in statistics and computing to jumpstart work on research projects. As the program proceeds, the morning lectures turn toward advanced statistical and machine learning topics. In the final weeks, students hear about big data applications from a different perspective, that of non-statisticians. Clinicians, epidemiologists, and sociologists give examples of how they use big data and provide insights into their collaborations with quantitative scientists.

Each afternoon, students split into smaller groups for a deep-dive into faculty-mentored research. Each group consists of 10–12 BDSI students focusing on a specific research domain under the direction of 2–3 faculty mentors and 1–2 graduate students. The 2019 cohort explored projects in genomics, machine learning, and data mining, while previous topics included medical imaging and electronic health records. The afternoon sessions allow students to immediately apply concepts introduced during morning lectures to real-world data and discuss results and next steps with their faculty mentors. Many times, the projects are designed with an open-ended aspect to allow students to incorporate their individual curiosities and interests.

Students showcase their research at the concluding symposium. Dressed in fine attire, they take center stage to deliver talks to Michigan faculty and graduate students. This year's symposium included a keynote by Blake McShane, associate professor of marketing at Northwestern University's Kellogg School of Management, in which he challenged the BDSI students to reconsider the interpretation of *p*-values when assessing statistical significance. In previous years, Rachel Schutt, co-head of the AI Lab in BlackRock and coauthor of Doing Data Science, has given presentations.

Students learn more than just statistics during their six-week stay in Ann Arbor. They form a close-knit network, bonded over late-night study sessions and social activities like canoeing down the Huron River, a road trip to the Detroit Museum of Art and, of course, a guided tour of the Big House. They listen to a special weekly seminar series of "Journey Lecture" by scientists across their career spectrum as multi-ethnic cuisine is served for lunch. The students also receive resources for professional development and coaching to prepare for graduate school.

This network of friendship, mentoring, and support persists well beyond the summer. Thanks to social media, students remain close as they complete their undergraduate educations and enter the next phases of their lives. Many students even reunite in graduate school, as is the case for 17 BDSI alums currently enrolled in the department of biostatistics at the University of Michigan. ■

**MORE ONLINE**
Applications for the 2020 program are being accepted. Visit *https://sph.umich.edu/bdsi.*

## Government Statistics

The Government Statistics Section (GSS), Survey Research Methods Section (SRMS), and Social Statistics Section (SSS) are sponsoring a student and postgraduate paper competition. Winners will present their papers at a topic-contributed session during the 2020 Joint Statistical Meetings (JSM) in Philadelphia, Pennsylvania. Competition winners will also be recognized during the 2020 SRMS, GSS, and SSS business meetings at JSM.

Up to five $1,000 awards will be granted to help cover JSM 2020 expenses. Applications are due at 11:59 p.m. EST December 21, 2019.

For more information, visit the GSS website at *https://community.amstat.org/governmentstatistics-section/awards/competitions.* ■

## Physical and Engineering Sciences

*Byran Smucker, 2019 SPES Outgoing Chair*

In one telling of the trajectory of the Section on Physical and Engineering Sciences, we are yesterday's news. In this version, industrial and engineering statistics crested decades ago and SPES is just clinging to a small, niche corner of the statistics profession. We are more or less irrelevant in the era of big data analytics.

But there is a different lens through which to view SPES, one that suggests we are well-positioned to make a substantial mark on our field going forward. In engineering and the physical sciences, we observe increasing data abundance. While traditional approaches to data analysis, experimental design, quality control, and reliability are still critical for many members of SPES, a new graduate working as a statistician in industry or among engineers and physical scientists is more likely to build predictive models as they would be to design a small experiment. Given the changing landscape, the new tools used in the analysis of big data are relevant and should be seized upon by our constituency.

But there's more.

Not only are the tools of analytics just as relevant in SPES domains as in many others, the traditional areas we have cultivated over the years have an important role to play in advancing data science. Allison Jones-Farmer (*http://asq.org/statistics/2009/02/asq-statistics-division-newsletter-winter-2009.html*), in the 2018 Youden Address, argued that industrial statisticians have training in three areas that many data scientists do not: (1) up-front study design; (2) inferential validity; and (3) understanding the differences between confirmatory, explanatory, and predictive modeling.

To take the first—which is near and dear to my heart—the "old news" view sees the small data of traditional experimental design as increasingly irrelevant in a big data world. But look a little closer and connections between data science and experimental design are important and plentiful. Nathaniel Stevens pointed out that experimental design expertise is sought after by many technology companies, and working data scientists have noted this as well (*https://hackernoon.com/the-ai-hierarchy-of-needs-18f111fcc007*). In areas as diverse as online experiments, subsampling, active learning, causal inference, and algorithm tuning, design thinking and ideas are critical to data science.

The traditional areas in SPES are not going away. There are still increasingly complex and expensive processes and products to study, monitor, and improve. There are still difficult questions in the physical sciences that require classical statistical methods. But we shouldn't limit ourselves to the methods that have always been used in our section. Let's welcome new types of data and methodologies into our statistical repertoire; let's use these new opportunities to make research contributions to areas in data science and machine learning and be alert for ways our training can be brought to bear in big data domains. If the future of data science is bright, so is the future of SPES. ■

## Survey Research Methods

At our business meeting, we celebrated the SRMS Student Travel Award winners, GSS/SRMS/SSS Student Paper Award winners, SRMS Poster Award winners, and SRMS members who became ASA Fellows (Babette Brumback of the University of Florida, Craig Hill of RTI International, and Jonathan Schildcrout of Vanderbilt University).

Look for section news in the SRMS Newsletter in July and January in preparation for JSM 2020 in Philadelphia, to be held August 1–6. Also, watch for the 2019 JSM Proceedings to appear on our website next year at *www.asasrms.org/Proceedings/index.html* and make plans to attend the SRMS business meeting in Philadelphia.

For more information visit *https://magazine.amstat.org/blog/category/membernews/amstatsections/survey-research-methods.* ■

## North Carolina Chapter

The ASA's North Carolina Chapter held a recycled poster session and social at SAS Institute in Cary on September 12. In attendance were more than 50 statistics professionals and students.

Some attendees brought their old posters from a previous conference to display again, while others chose to practice presenting a new poster for an upcoming meeting. Many just spent the evening browsing their local fellow statisticians' work.

In total, there were 18 posters on display competing for two best poster awards. The posters were judged by Sujit Ghosh from North Carolina State University and Sudipta Dasmohapatra from Duke University. The winners received a free ticket to the NC ASA Fall Dinner and a certificate.

This event allowed local statisticians a chance to gather, mingle, and learn about the statistical work being done by fellow North Carolina statisticians.

## California

■ The Department of Statistics at the University of California, Riverside invites applications for a tenure-track assistant teaching professor position (also termed lecturer with Potential Security of Employment, LPSOE), beginning July 1, 2020 or even earlier. The details are available at the website: *https://aprecruit.ucr.edu/apply/JPF01175*. Evaluation of applications will continue until the position is filled. EOE.

■ The USC Marshall School of Business, Data Sciences and Operations Department invites applications for a non-tenure track (teaching) position. Candidates should have a PhD in operations management, statistics, information systems or a related discipline, or be assured of its completion by fall 2020. Apply online *https://facultypositions.usc.edu/FAS/application/position?postingId=REQ20081265*. EOE.

Professional Opportunity listings may not exceed 65 words, plus equal opportunity information. The deadline for their receipt is the 20th of the month two months prior to when the ad is to be published (e.g., May 20 for the July issue). Ads will be published in the next available issue following receipt.

Listings are shown alphabetically by state, followed by international listings. Vacancy listings may include the institutional name and address or be identified by number, as desired.

Professional Opportunities vacancies also will be published on the ASA's website (*www.amstat.org*). Vacancy listings will appear on the website for the entire calendar month. Ads may not be placed for publication in the magazine only; all ads will be published both electronically and in print.

These listings and additional information about the 65-word ads can be found at *ww2.amstat.org/ads.*

Employers are expected to acknowledge all responses resulting from publication of their ads. Personnel advertising is accepted with the understanding that the advertiser does not discriminate among applicants on the basis of race, sex, religion, age, color, national origin, handicap, or sexual orientation.

Also, look for job ads on the ASA website at *https://jobs.amstat.org/jobseekers.*

DEPARTMENT OF STATISTICS

**COLUMBIA UNIVERSITY**

**FACULTY POSITION (TENURE-TRACK) STARTING FALL 2020**

The Department of Statistics invites applications for a tenure-track Assistant Professor position to begin July 1, 2020. A Ph.D. in statistics or a related field is required. Candidates will be expected to sustain an active research and publication agenda and to teach in the departmental undergraduate and graduate programs. The field of research is open to any area of statistics and probability.

The Department currently consists of 35 faculty members, 59 PhD students, and over 300 MA students. The Department has been expanding rapidly and, like the University itself, is an extraordinarily vibrant academic community. We are especially interested in candidates who through their research, teaching and/or service will contribute to the diversity and excellence of the academic community. Women and minorities are especially encouraged to apply. For further information about the Department and our programs, please go to our webpage at: *http://www.stat.columbia.edu*

All applications must be submitted through Columbia's online Recruitment of Academic Personnel System (RAPS) at:
*http://pa334.peopleadmin.com/postings/4156*

The application must include a cover letter, curriculum vitae, statement of teaching philosophy, research statement and the names of 3 references. References will be asked to upload letters of recommendation in RAPS.

Inquiries may be made to *dk@stat.columbia.edu*

Review of applications begins on November 29, 2019, and will continue until the position is filled.
Columbia University is an Equal Opportunity/Affirmative Action employer.

## Georgia

■ Tenure-track assistant professorship in data science, Department of Statistics, University of Georgia, starting August 1, 2020. Requires PhD in statistics or related discipline by 8/3/2020. To apply, visit *www.ugajobsearch.com/postings/124481.* Applications received by 11/26/2019, are ensured consideration, but review will continue until the position is filled. EOE.

## Indiana

■ Director of Education (associate or full professor), Department of Biostatistics/ Richard Fairbanks School of Public Health, Indianapolis, IN. Duties: Directing degree programs in Biostatistics (MS and PhD) and Health Data Science (BS), statistical research, teaching, collaborative research. PhD in biostatistics, statistics or related field, excellent communication skills required; Competitive salary/excellent benefits. Submit CV, research/teaching statements, 3 references to: *http://indiana.peopleadmin.com/postings/8582*. Indiana University is an EEO/ AA employer, M/F/D/V.

## Kansas

■ Department of Mathematics, University of Kansas invites applications for a tenure-track, assistant professor position in statistics to begin August 18, 2020. Requirements include a PhD in mathematics, statistics or related fields and outstanding publication record in statistics. For complete announcement and to apply online, go to *https://employment.ku.edu/academic/15639BR*. At least four recommendation letters should be submitted to *www.mathjobs.org/jobs/jobs/14660*. KU is an EO/AAE. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex (including pregnancy), age, national origin, disability, genetic information or protected Veteran status.

## Mississippi

■ Assistant Professor requirements include a doctoral degree in statistics, commitment to effective graduate/undergraduate teaching and demonstrated success in research. Apply online *www.msujobs.msstate.edu* (PARF 499442) and attach a curriculum vitae/résumé and cover letter addressed to Chair, Statistics Search Committee, Department of Mathematics and Statistics, Mississippi State, MS 39762. Submit transcripts, a summary of research plans, a statement of teaching philosophy, and three letters of recommendation. MSU is an equal opportunity employer, and all qualified applicants will receive consideration for employment without regard to race, color, religion, ethnicity, sex (including pregnancy and gender identity), national origin, disability status, age, sexual orientation, genetic information, protected veteran status, or any other characteristic protected by law. We always welcome nominations and applications from women, members of any minority group, and others who share our passion for building a diverse community that reflects the diversity in our student population.

## New Jersey

■ The Department of Statistics of Rutgers University seeks outstanding applicants for tenure-track positions of assistant/associate professors for fall 2020. Applicants must have a PhD in statistics or related field by Sept. 1, 2020. Responsibilities include: teaching/ supervising undergraduate and graduate programs, conducting original research in broad areas of statistics; Bayesian and spatial statistics preferred. Pursuit of external research funding is expected. Apply online at *http://jobs.rutgers.edu/postings/100289*.

COLUMBIA UNIVERSITY | MAILMAN SCHOOL of PUBLIC HEALTH

**Open-Rank Faculty position(s) at the Department of Biostatistics, Columbia University**

**The Department of Biostatistics at Columbia University's Mailman School of Public Health** seeks applicants for multiple open-rank tenure-track, tenured, or non-tenure track faculty positions in Biostatistics. The Department of Biostatistics at Columbia University is one of the premier biostatistics departments in the nation. The Department has more than 30 faculty (including 12 ASA Fellows) and 15 biostatistician research staff members. The Department boasts strong research profiles in clinical trial design, survival analysis, nonparametric and semi-parametric statistics, precision medicine, causal inference, machine learning, functional data analysis, imaging statistics, statistical genetics, statistical methods for mental health and many other fields. The Department has built strong collaborative connections within the Mailman School of Public Health (MSPH), a top-ranked school nationally, and in the world-class Columbia University Irving Medical Center (CUIMC). The Department has thriving education programs leading to M.S., M.P.H., Ph.D., and Dr.P.H. degrees.

**MSPH** is one of the largest recipients of sponsored research for all schools of public health in the nation. Its internationally recognized and highly interdisciplinary faculty is comprised of over 500 full-time faculty members, of whom almost 40 percent hold joint or interdisciplinary appointments with other departments of the university, as well as a large network of adjunct faculty.
**CUIMC** includes four schools (Vagelos College of Physicians and Surgeons, College of Dental Medicine, School of Nursing, and Mailman School of Public Health) and accounts for roughly half of the University's $4 billion annual budget. CUIMC provides world-class leadership in scientific research, health and medical education, and patient care. CUIMC faculty have made profound breakthroughs historically — among them, the first blood test for cancer, the first medical use of the laser, and the first successful transfer of genes from one cell to another.

**Responsibilities:** Successful candidates will maintain an active research program, both in biostatistical methodology and in collaborative research; teach effectively, both to graduate students in biostatistics and to students from outside the department; mentor graduate students; provide service to the department, the school, the university, and the profession.
**Qualifications:** Competitive candidates will hold a doctoral degree in biostatistics, statistics, or related quantitative field by the start date. Candidates with statistical and biostatistical expertise in the application of broad biomedical sciences are welcome to apply. Areas of interest include (but not restricted to) computational statistics, machine learning, big data methods with applications to omics, neuroimaging, electronic health records or large-scale observational studies, mHealth, statistical genetics/genomics, spatial statistics and precision medicine. Consideration for tenure requires strong teaching, research and publication records in addition to the ability to secure external funding. Junior faculty candidates should demonstrate clear outstanding potential in research, teaching, and the ability to secure independent funding; senior faculty candidates should be internationally recognized scholars who demonstrate a strong track of record of excellence in research, teaching, and mentoring.

**Applications:** Submit a letter of interest curriculum vitae, statement of research and teaching philosophy, three recommendation letters, and graduate and undergraduate transcripts for expected and recent doctoral graduates (unofficial transcripts acceptable). to: http://pa334.peopleadmin.com/postings/4391
**Deadline:** Review of applications begins mid-December 2019.
**Contact:** Contact Katy Hardy (ch336@cumc.columbia.edu) with any questions.

***Columbia University is an Equal Opportunity/Affirmative Action Employer -- Race/Gender/Disability/Veteran***

## North Carolina

■ The Department of Statistics and Operations Research at the University of North Carolina, Chapel Hill has an opening for a tenure-track position in any area of statistics at the assistant professor level starting July 1, 2020. Submit an online application for vacancy ID FAC0002957 at *http://unc.peopleadmin.com/postings/169804*. University of North Carolina at Chapel Hill is an equal opportunity and affirmative action employer.

## South Carolina

■ The Department of Epidemiology and Biostatistics and Big Data Health Science Center at the University of South Carolina invites applications for a tenure-track associate professor position in biostatistics. Successful applicant will have a successful track record of competitive external funding and expertise in data science (e.g. EHR, bioinformatic/genomic or geospatial data). Application review will begin immediately and continue until position filled. Submit application at *http://uscjobs.sc.edu/postings/68417*. EOE.

## Vermont

■ Tenure Track Assistant Professor in Biostatistics. Department of Mathematics and Statistics, University of Vermont. Candidates are required to have a research focus on infectious diseases. The position involves a secondary appointment in the UVM Larner College of Medicine and being a junior investigator in UVM's NIH-funded COBRE on translational global infectious disease research. All application materials must be submitted online at *www.uvmjobs.com/postings/38011*.

## Virginia

■ Department of Statistics, University of Virginia, invites applications for two positions, associate/full professor and assistant professor. Applicants must present evidence of outstanding accomplishments

and promise in research and teaching. Candidates should be dedicated to UVa's mission of excellence in research, teaching graduate/undergraduate courses, interdisciplinary collaboration, and service. Department is growing from increased student demand in statistics and computing. See *www.statistics.as.virginia.edu.* University of Virginia is an EO/AA Employer.

The GMU Department of Statistics invites applications for multiple tenure-track/tenured positions beginning Fall 2020. Senior candidates with outstanding research, demonstrated funding, and excellent teaching will be eligible for tenured associate or full professor positions. See *https://jobs.gmu.edu/postings/47002* for the complete ad and apply with position number F465AZ at *http://jobs.gmu.edu*. The review of applications began December 2, 2019, and will continue until the positions are filled. ■

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

The Department of Biostatistics at the Johns Hopkins Bloomberg School of Public Health is seeking outstanding colleagues to join our tenure track faculty. Rank of appointment will be commensurate with experience. Both new PhDs and recent postdoctoral fellows are encouraged to apply. Candidates should have a PhD or equivalent in statistics, biostatistics, or a comparable field.

The Hopkins Department of Biostatistics, founded in 1918, was the first degree-granting department of statistical science in the US and has ranked among the world's best throughout its history. Today, the Department comprises 23 tenure track faculty members, 20 research track faculty, 12 postdoctoral fellows and 76 students, two-thirds seeking PhDs. The Department has a proud history of collegiality and diversity. Margaret Merrell, the School's first female faculty member, was appointed in 1930 and became the School's first female professor. We highly value this tradition: Women and under-represented candidates are particularly encouraged to apply.

The Department's faculty, students and fellows strive to be influential at the interface of the statistical and health sciences, with the ultimate goal to increase the health of all people. The Johns Hopkins Schools of Public Health, Medicine, and Nursing, the Johns Hopkins Health System, and the Johns Hopkins University are among the top worldwide and provide a research and educational environment in which faculty can achieve scientific excellence. Current areas of expertise, like our people, are diverse, ranging from the real-time analysis of large, streaming data to philosophy and implementation of data science to statistical theory and methods. Our health applications include genomics, neuroimaging, clinical trials, population modeling, environmental health and many others. Learn more at *https://www.jhsph.edu/departments/biostatistics/*.

**TO APPLY**
Submit cover letter, CV, statements on research and educational interests and goals, two manuscripts or articles representing your most important work, and the identity of three references who you have asked to provide supporting letters to *https://apply.interfolio.com/66969*

The Johns Hopkins University is an affirmative action/equal opportunity employer committed to recruiting, supporting and fostering a diverse community of scholars. The Johns Hopkins University is a smoke-free environment and as such prohibits smoking in all facilities. The Johns Hopkins University is a drug-free workplace.

DEPARTMENT OF STATISTICS
**Columbia University**
**Distinguished Postdoctoral Fellow in Statistics Positions Starting Fall 2020**

The Department of Statistics invites applications for Distinguished Postdoctoral Fellowships in Statistics. These fellowships seek to bring exceptional scientists of outstanding potential to Columbia University. These two-year fellowships, with no teaching obligations, are to begin between July and September 2020. The Fellows will hold the rank of postdoctoral research scientist in the Department of Statistics. A competitive annual salary will be supplemented with generous funding for conference travel and research support.

Applications in all areas of statistics and probability will be considered: the primary selection criterion will be the candidates' exceptional promise to produce high quality and visible research. Candidates must have a PhD in statistics or related field by the date of appointment. Fellows will be expected to pursue a vigorous research agenda and to participate actively in the intellectual life of the Department.

The Department currently consists of 35 faculty members and 59 PhD students. The department has been expanding rapidly and, like the University itself, is an extraordinarily vibrant academic community. We are especially interested in candidates who, through their research, teaching and/or service, will contribute to the diversity and excellence of the academic community. Women and minorities are especially encouraged to apply. For further information about the department and our activities, centers, research areas, and curricular programs, please go to our web page at: *http://www.stat.columbia.edu*

All applications must be submitted through Columbia's online Recruitment of Academic Personnel System (RAPS) at: *http://pa334.peopleadmin.com/postings/4198*

The application must include the following:

- A cover letter that explains your motivation for applying for this position and indicates your choice of mentors from the statistics faculty.
- A curriculum vitae (including a list of publications)
- A brief research statement that summarizes current research interests, past accomplishments, and future research goals. It should contain a short proposal for the research activities you plan to conduct while at Columbia.
- The names of 3 references—references will be asked to upload letters of recommendation in RAPS.

Review of applications begins on January 13, 2020, and will continue until the position is filled.

Inquiries may be made to *dk@stat.columbia.edu*.

Columbia University is an Equal Opportunity/Affirmative Action employer —Race/Gender/Disability/Veteran.

NC STATE UNIVERSITY

## Department of Statistics
## Tenure-Track Faculty Positions

The Department of Statistics at North Carolina State University seeks to hire multiple tenure-track faculty. All ranks will be considered. The start date is August 2020.

Applicants with interests and expertise in theoretical or methodological research in any area of statistics or biostatistics will be considered. Candidates with interests in data science, machine learning, and modern methods of data analysis more generally are encouraged to apply. The ability and desire to supervise graduate student research and to pursue excellence in teaching are essential.

To apply, please visit: https://jobs.ncsu.edu/postings/120549

The Department provides a dynamic environment for teaching, research and collaborations across disciplines. Inclusiveness and diversity are academic imperatives and are university goals: You will be expected to foster an environment that is supportive and welcoming of all groups. We are interested in candidates who have experience working with students from diverse backgrounds and have a demonstrated commitment to improving access to higher education for students from underrepresented groups.

The Department's location in the Research Triangle provides rich opportunities for interactions with industry; other universities, including Duke University and the University of North Carolina at Chapel Hill; and government agencies. Faculty enjoy collaborations with medical researchers at Duke, environmental scientists at the EPA research facility, pharmaceutical researchers at Glaxo-SmithKline, and software developers at SAS Institute, among many others. The Department is also a founding cooperator of the NSF-funded Statistical and Applied Mathematical Sciences Institute (SAMSI), located nearby in Research Triangle Park.

All applicants must have a Ph.D. in Statistics or Biostatistics or a related field by the time of employment. Review of applications will begin soon, and continue until the positions are filled. Questions about the search may be directed to the Search Committee Chair (stat_search@stat.ncsu.edu).

NC State University is an equal opportunity and affirmative action employer. Women and members of other underrepresented groups are encouraged to apply. In addition, NC State University welcomes all persons without regard to sexual orientation or genetic information.

DEPARTMENT OF STATISTICS

## Columbia University
## Assistant Professor (Limited-term) Positions starting Fall 2020

The Department of Statistics invites applications for four-year term positions at the rank of Assistant Professor to begin July 1, 2020. A PhD in statistics or a related field is required, as is a commitment to high quality research and teaching in statistics and/or probability. Candidates will be expected to sustain an active research and publication agenda and to teach in the departmental undergraduate and graduate programs. Candidates with expertise in machine learning, big data, mathematical finance and probability theory are particularly encouraged to apply.

The department expects to support successful candidates with a generous research allowance. The expected teaching load is three semester-long courses per year.

The department currently consists of 35 faculty members and 59 PhD students. The department has been expanding rapidly and, like the University itself, is an extraordinarily vibrant academic community. We are especially interested in candidates who, through their research, teaching and/or service, will contribute to the diversity and excellence of the academic community. Women and minorities are especially encouraged to apply. For further information about the department and our activities, centers, research areas, and curricular programs, please go to our web page at: *http://www.stat.columbia.edu*

All applications must be submitted through Columbia's online Recruitment of Academic Personnel System (RAPS) at: http://pa334.peopleadmin.com/postings/4158

The application must include a cover letter, curriculum vitae, teaching statement, research statement and the names of 3 references. References will be asked to upload letters of recommendation in RAPS.

Inquiries may be made to Dood Kalicharan at *dk@stat.columbia.edu*

Review of applications begins on December 2, 2019, and will continue until the position is filled.

Columbia University is an Equal Opportunity/Affirmative Action employer – Race/Gender/Disability/Veteran.

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**Caleb King** @ckingstats
Always, always, always plot the data before you start analysis! Still working on making this a habit.

**VlakePhoenix** @VlakePhoenix
Clearly state the limitations of the inferences made based on data.

**Rob Santos** @_Rob_Santos
Cherish your significant other....

**Jim Fros** @statisticsbyjim
Skepticism!

**Roland Matsouaka** @matsouaka
Always generate a statistical analysis plan that every stakeholder will agree on, before running any analysis. This helps you avoid embarking [on] an endless rabbit-hole pursuit of the elusive significant p-values from your clinical collaborators.

**Harry Smith** @HarryASmith9002
Comment your code. Your future self is always one of your collaborators.

**Steve Ellison** @slrellison_lgc
Keep learning.

For next month, we'll ask our followers—"If you could interview one statistician or data scientist, who would it be?" Make sure to tag @AmstatNews in your response.

**Eric J. Daza** Check your analysis assumptions, and report how well they're met. If you can't, report the implications if not met. At the very least, acknowledge them explicitly.

**Erfan Pirbhai** Live in the "moment."

**Ben Power** Question everything, especially your own findings. But know when your questions have been sufficiently answered.

**Grant Reinman** Be an active, constant learner. Statistical sciences are changing and growing rapidly.

**Becky Elliott** Make sure you know what the real question is before collecting the data.

**Mhd Hasan Almekdash** Reading (critically).

**Guoguo Zheng** Understand and enjoy the interactions between data and models.

**Carolina Liskey** Fit the model to the problem, not the data to the model.

**Won Chang** calm down and plot the data

**Yiannis Kontoyiannis** be there *before* the data is collected

DID YOU KNOW?

# SAS/STAT® 15.1 OFFERS BRAND NEW CAPABILITIES.

## SAS/STAT 15.1 **HIGHLIGHTS**

Bayesian generalized linear mixed models.

Causal graph analysis.

Regression for time-to-event data based on restricted mean survival time.

Counterfactual analysis using quantile regression.

Semiparametric proportional hazards model for interval-censored data.

## Recent SAS/STAT **ADDITIONS**

Casual mediation analysis.

Compartmental models for pharmacokinetic analysis.

Fast quantile process regression.

Cause-specific proportional hazards analysis for competing-risks data.

Variance estimation by the bootstrap method.

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