



virtuAIChE®

*This month's meeting:*

*Primary (with live discussion/live chat) Wednesday, Aug 25 at 9 pm ET (US) / 1 am GMT  
Alternate 1 (with live discussion/live chat) Thursday, Aug 26 at 7 am ET (US) / 11 am GMT  
Alternate 2 (with live discussion/live chat) Thursday, Aug 26 at 1 pm ET (US) / 5 pm GMT*

## How Can Nuclear Energy Help Fight Climate Change?

Presented by Dr. Rachel Slaybaugh,  
Cyclotron Road Division Director at Lawrence Berkeley National Lab and Associate Professor of Nuclear Engineering at the University of California, Berkeley.



Nuclear energy has looked about the same for the last 60 years. Now, startups and the innovation arms of larger companies are looking to deploy new kinds of reactors in the 2030 timeframe. What's different about those technologies? How do they fit into our larger decarbonization plan? Do we still need the reactors we've already got? This talk will focus at a high level on the role nuclear technology could play in the clean energy future of the U.S. and the world.

Dr. Rachel Slaybaugh is the Cyclotron Road Division Director at Lawrence Berkeley National Lab and an Associate Professor of Nuclear Engineering at the University of California, Berkeley. Slaybaugh researches computational methods applied to nuclear reactors, nuclear non-proliferation and security, and shielding. Slaybaugh recently served as a Program Director at the Department of Energy's ARPA-E. She is also Board Chair for Good Energy Collective, a Faculty Affiliate at the Berkeley Institute of Data Science, and serves on several advisory committees.

Slaybaugh received a BS in Nuclear Engineering from Penn State, where she served as a licensed nuclear reactor operator, and a PhD from University of Wisconsin–Madison in Nuclear Engineering. Slaybaugh's Rickover Fellowship took her to Bettis Atomic Power Laboratory before joining Berkeley.



***Note that registration for VLS meetings is required.  
Our meetings are still free to attend and open to all.***

## **August Meeting Registration Information**

<b>Primary</b>	<b>Alternate 1</b>	<b>Alternate 2</b>
(Live Presentation/Live Chat)	(Recorded Presentation/Live Chat)	(Recorded Presentation/Live Chat)
August 25 at 9 PM EST / 1 AM GMT	August 26 at 7 AM EST / 10 AM GMT	August 26 at 1 PM EST / 5 PM GMT
Register in advance for the <a href="#">Primary Meeting</a>	Register in advance for the <a href="#">Alternate 1 Meeting</a>	Register in advance for the <a href="#">Alternate 2 Meeting</a>

After registering, you will receive a confirmation email containing instructions for joining the meeting, along with add-to-calendar links.

## **The AIChE K-12 STEM Outreach Competition is back!**

Dear AIChE K-12 Community Members,

Are you actively engaged in outreach with K-12 students in your community? Don't miss out on this opportunity to open eyes to the wonders of STEM and inspire your AIChE peers!

The 3rd AIChE K-12 STEM Outreach Competition will take place on Sunday, November 14, 2021 and Monday, November 15, 2021. We're excited to announce that this year's competition will be held virtually for increased participation of K-12 students, parents, and educators.

All AIChE members are encouraged to enter for a chance to showcase their interactive STEM experiments, demonstrations, and discussions to K-12 students, their parents, and educators, and members of the AIChE community. Interested teams and individuals must submit an entry by September 1st in order to be considered for selection. Visit our website for more information and to submit an entry.

We look forward to seeing your entries!

Questions? Contact us at [k12@aiche.org](mailto:k12@aiche.org).

ChEers,

Emily Miksiewicz

AIChE K-12 Programs

[k12@aiche.org](mailto:k12@aiche.org)

## Introducing Our June Meeting Raffle Winner!

*Every month, a dues-paying member who signed in for the duration of the monthly webinar is selected at random to win a free year of VLS membership (Executive Committee members and previous winners during the current year are ineligible). We are pleased to introduce our June winner – Thomas (Tom) Plocek.*



### **Q: What made you want to be a chemical engineer**

I have always been interested in everything around me, living things and building things. When I was young, insects, frogs, tree houses and boats. While watching houses being built across the street, I realized I would need to be able to read blueprints and took engineering drawing in high school and later worked as a carpenter's helper to learn how to build my first two homes. I knew I wanted to be an engineer because I was good at science and math and at that time, a language (where I was terrible) was not required for engineering. When I started work in a small chemical plant, I became interested in chemistry, processing equipment, and later organizing and building specialty chemical plants. I am now interested in OTEC, Ocean Thermal Energy Conversion as a solution to base load electricity generation while helping to solve global warming and synthetic biology for clean safe chemical processing.

### **Q: : What school(s) did you go to?**

I did one year of engineering at Rutgers University in New Brunswick followed by 10 years at night school in Newark. Engineering was not available at night school, so I graduated with a BA in Chemistry (after the German language requirement was dropped). My chemical engineering and project management knowledge has come from working with experts. I understand many of the concepts but cannot do the calculations.

### **Q: What kinds of jobs have you held?**

After dropping out of day school, I started working as a chemical operator in a small aroma chemical plant in Newark. I moved into QC and as my education progressed, I researched chemical reactions in Chemical Abstracts in the Newark Library and found some key reactions that I later commercialized. After buying the small company, I organized and built a grass roots chemical plant in Puerto Rico, then in Newark where I overexpanded and had to sell the company. I then worked as an international consultant and later joined a big company and built a plant in China. After leaving the big firm, I helped start a new company now producing aroma chemicals in Romania and am a Managing Director and part owner.

### **Q: Where do you live?**

My primary residence is in Scotch Plains New Jersey. I have lived in the area for most of my life. I have a flat in Germany where I spent 3-4 months a year doing my primary work and live part time doing remote work from a boat between Puerto Rico and the Virgin Islands.

### **Q: Why did you join the Virtual Local Section?**

I am interested in what is going on in chemical engineering and it seemed like this was a convenient way to keep currently knowledgeable and involved. And, hopefully to influence others.

**Q: Any hobbies that are connected to chemical engineering**

I suppose most of my projects involve chemical engineering to some extent. Covid got me involved in Hydroponics and fermentation. I keep learning about and pushing Molecular Biology and OTEC all the time. Now I can again hug my grandchildren and have meals with friends and family. I walk and do trips and stuff with my wife of 58 years.

## **Is There a Difference Between A Data Scientist And A Data Engineer - And How and Why You Can Get In These Growth Professions of Tomorrow?**

by Dr. Lucia Feng, President & CEO  
OnCareerSuccess Inc.

Most people want a job that brings a significant sense of purpose, allows them to learn new skills, and is a secure well-paying job with growth potential in the professions of tomorrow.

Data professionals – namely, Data Engineer and Data Scientist, are two job titles that fit the above description. Data Engineer can also be called Data Analyst.

Data, collected through diverse structured, unstructured, and semi-structured data sources, are becoming more and more important as digital transformation of the workplace, e-commerce, and artificial intelligence (AI) steadily take place. In particular, the World Economic Forum [1] has mapped out “data analysis” as a skill needed in the millions of new jobs created in the professional cluster categories of “Data and AI”, “Engineering and Cloud Computing”, “Green Professionals”, and “Marketing, Sales and Content” as a result of demographic change, industrial transitions, changing consumer needs and the arrival of the Fourth Industrial Revolution.

Commonly referred to as Industry 4.0, the Fourth Industrial Revolution is a technology ecosystem called Industrial Internet of Things (IIoT) that is comprised of smart sensors and actuators connected and communicating across networks via the internet or the appropriate communication technologies to monitor and enhance manufacturing and industrial processes. Furthermore, as many industries such as heavy machinery, transportation, healthcare, smart cities, governments, oil and gas, utilities and others move to adopt Industry 4.0, and as the fifth generation (5G) technology standard for broadband cellular network becomes more prevalent, working with data to gain granular insights and solve business problems such as improved quality control, sustainable and green applications, supply chain traceability, supply chain efficiency, asset tracking, predictive maintenance, marketing campaign effectiveness, automation and many other applications will significantly contribute to the growth of developed and developing nations’ economies and productivities.

Data are also generated by the consumer-level devices that communicate and connect on the internet which we refer to the Consumer Internet of Things (IoT). These devices could be smart wearables, smartphones, smart home appliances such as TVs and your HVAC thermostat, and heart monitoring devices just to name a few.

For context on how much data is created every day and therefore actionable intelligence to be extracted, Visual Capitalist [2] estimated that 464 exabytes of data will be generated each day globally by the year 2025 – that’s equivalent to the contents held by 212,765,957 DVDs per day. One “exabyte” is equal to 1 billion gigabytes. Some examples of data sources could be tweets sent, emails sent, data

created on Facebook, messages sent on WhatsApp, videos on YouTube, internet searches made, data created by each connected car, equipment performance of pumps, blowers, mass flow controllers, etc.

### **Definitions of Data Engineer and Data Scientist**

Data engineer and data scientist share overlapping duties and responsibilities with many of the same baseline skills. According to Josh Fruhlinger of Hewlett Packard Enterprise [3], the data analysts “tend to focus on simpler, more immediate issues”, while the data scientists “look at the bigger picture”. The data scientists tend to hold more advanced degrees and earn more money. It’s common for data engineers to become data scientists as they acquire more skills in their career progression.

Fruhlinger further referenced the difference between the data engineer/analyst and data scientist using the Northeastern University descriptions from the undergraduate and graduate programs in data science [3]:

- “Data analysts(engineers) examine large data sets to identify trends, develop charts, and create visual presentations to help businesses make more strategic decisions”
- “Data scientists...design and construct new processes for data modeling and production using prototypes, algorithms, predictive models, and custom analysis.”
- In addition, Fruhlinger [3] further distinguishes between data scientists and data analyst/engineers referencing Simplilearn’s Big Data and Analytics Certification Program in:
- “A data scientist is expected to formulate the questions that will help a business and then proceed in solving them, while a data analyst/(engineer) is given questions by the business team to pursue a solution with that guidance.”

### **What Does A Data Engineer Do?**

University of California at Riverside, which offers degree programs in data science at the undergraduate and graduate levels, defines “data engineers are charged with developing the equipment, architectures and systems that make the acquisition of data possible...so the information gathered can be parsed, evaluated or analyzed.” [4].

As the data engineer’s job is designing the systems for data collection and data processing, they also need to look for any trends or patterns in the data sets they work with in order to understand what algorithm they need to create to capture and interpret the raw data so their clients can extract insights to better understand the data collected.

Northeastern University [5] lists the common responsibilities that data engineers could typically do in their jobs are:

- Design and maintain data systems and databases, including fixing errors in the code or data
- Mine data from primary and secondary sources, and reorganize data in formats to be read by machine or human
- Use statistical tools to interpret data sets for trends and patterns for diagnostic and predictive analytics
- Collaborate with programmers, engineers, and functional leaders in the company/organization to identify areas for process improvement, recommend system modifications and develop policies for data governance



- Prepare reports for management on conclusions and relevant trends, patterns, and predictions
- Create documentation to help stakeholders to understand the steps of the data analysis

### **What Does A Data Scientist Do?**

A data scientist helps an organization to formulate questions/hypotheses and interpret data for insights to solve problems. Depending on the problem at hand, the data scientist may design data modeling processes, create the algorithms and predictive models to extract the data the business/client needs, analyze the data and share insights with the client [6]. It's critically important that the data scientist can communicate the findings and insights in language – whether storytelling with data verbally, visually, or by both ways – to their clients/businesses they can understand so decisions or learning can be applied to solve a problem or develop new products or capabilities.

Although responsibilities and tasks may vary due to project, position and company size, typical responsibilities for a data scientist may include [4, 6]:

- Ask the right questions for the business/client to identify the data needed
- Develop or refine the statistical learning models and algorithms to get the data for exploratory data analyses
- Consult with other members of the engineering team and possibly functional groups of the client/business
- Collect and authenticate data to ensure data accuracy and reliability before mining the data for trends and patterns
- Communicate insights and conclusions to client/business about what have been learned from the data

### **Skills Needed By Data Engineers and Data Scientists**

Both must have a combination of specialized hard technical skills and “soft skills” to thrive.

The core technical skills include foundational knowledge of mathematics and statistical analysis to help collect, measure, organize and analyze the datasets. Manipulating data for analyses on computers require knowledge and proficiency of computer programming languages such as Python, R, Java, FORTRAN, COBOL, and SQL to write code and algorithms; spreadsheet tools such as Microsoft Excel, Google Sheets, and other statistical programming languages; and data visualization software such as Tableau, Qlik, and SigmaPlot for storytelling of the actionable insights and conclusions in an effective way especially to a non-technical audience.

Compared to the data engineers, the data scientists generally have more advanced technical knowledge such as AI and machine learning because they need to build or fine tune the models to collect data for analyses. Hence a data scientist typically has advanced graduate degree(s) whereas the data engineer has only a Bachelor's degree.

While it is surprising to many, data engineers - and especially data scientists – must have “soft skills” because of the key role they play in helping clients/organizations understand the significance of the data insights and apply the learning to make sound decisions for the business/by the client. First and foremost, data scientists and data engineers must have strong interpersonal and emotional intelligence skills because they need to work effectively with coworkers and clients, and effectively

communicate technically and non-technically across diverse functional groups and across all levels in a business.

The data scientists, in particular, need to really understand the client's/organization's business in order to know the problems and what questions to ask to solve the business problem. That means the scientist must have, or need to immerse in the business to acquire, the knowledge in the field in which the business operates. They need to have "curiosity" or "inquisitiveness" to look beyond the surface of a problem so as to find patterns – and therefore solutions – within the data. They need to have intellectual "adaptability" to quickly acquire knowledge and come up to speed on the client's business. They also need "critical thinking" skill for objective analyses and figuring out what to ask in the first place, and "analytical thinking" skill to find analytical solutions for what can often appear to be abstract or amorphous business issue.

The data professionals who have the "hybrid" combination of hard specialized technical skills and soft skills will be most in demand by employers. In fact, Harvard Business Review has once bestowed onto the data scientist the title of "the sexiest job of the 21st Century"! [7]

### **Data Science Career Outlook**

The World Economic Forum, working in a study with three partner companies - Burning Glass Technologies, Coursera, and LinkedIn – identified data scientists as one of the "highest-growth jobs of tomorrow". Data scientists are also in high demand now. Glassdoor of the U.S. has ranked Data Scientist number 1 for the fourth straight year in the "Best Jobs in America" for 2019, and number 3 for the years of 2020 and 2021. The U.S. Bureau of Labor Statistics reported that "employment for all computer and information research scientists is expected to rise 16 percent by 2028 - a rate of increase exceeding many other professions." [6].

According to Glassdoor, the average data engineer salary is currently \$102,864 [4]. However, you should take this compensation number with a grain of salt as earnings can be significantly greater depending on experience, position, company size and geographical locations.

Glassdoor also reported that data scientists average base pay is \$113,309 with a range from \$83,000 to \$154,000. Again experience, job position level, company size and location can greatly affect the compensation. For example, the annual mean wage for data science professionals is \$140,100 for the San Francisco Bay Area [4].

There are many paths to the data science careers: self-taught, enroll in a degree/certification program at many established reputable universities; or combination of both. While the job title of data engineer is typically given to entry level employees such as new graduates, many Mid-Career engineers can pivot to port their skills to the ever-expanding data world and grow into data science jobs at different levels depending on interests and education training.

### **Summary**

While the choice of a job is a personal balance of one's strengths and interests, earning potential and job opportunities, your job choice also changes as you go through different phases in your life. As your personal needs and interests change, the job(s) you once wanted or interested to have when you first graduated from college or majored in college may no longer excite you when you progress to Mid-Career and/or Late Career.

There are many jobs/careers in the “professions of tomorrow” where “human and digital” worlds intersect that are fun, meaningful, have high career growth potential, pay well and are jobs in demand. The two jobs discussed in this article require higher cognitive skills and soft skills that “machines” cannot have. Hence, these jobs are examples of job opportunities that impart some degrees of job security and the skills to do these jobs confer career resilience. Lastly, think about what a humorous and unforgettable ice breaker statement it is in professional meetings or in your elevator pitch to say “I am a data scientist and I have the sexiest job in the 21st Century”!

**References:**

1. “Jobs of Tomorrow – Mapping Opportunity in the New Economy”, World Economic Forum, January 2020.
2. “Infographic: How Much Data Is Generated Each Day?”, Visual Capitalist, August 15, 2019.
3. J. Fruhlinger, “What is a data analyst, what is a data scientist – and how can you get started in these lucrative careers?”, Hewlett Packard Enterprise, Newsletter Article January 31, 2020.
4. “What Is The Difference Between A Data Scientist And Data Engineer?”, Blog by University of California at Riverside Online Master of Science in Engineering, June 2021.
5. B. Eastwood, “What Does a Data Analyst Do?”, Blog, Northeastern University Graduate Programs, April 17, 2019.
6. L. Doyle, “What Does A Data Scientist Do?”, Blog, Northeastern University Graduate Program, August 13, 2020.
7. “T. H. Davenport and D.J. Patil, “Data Scientist: The Sexiest Job of the 21st Century”, Harvard Business Review Magazine, Oct 2012.

## AIChE News

The AIChE hosts technical conferences around the world. Check [www.aiche.org/conferences](http://www.aiche.org/conferences) for registration and presentation information for this year’s events.

Dates	Event
Aug 16 – 19	2021 Offshore Technology Conference
August 17 – 18	RAPID DEPLOY: Modular Technologies for Capturing and Converting Waste Carbon
August 19	Enhancing Integrity Management of Aging Assets Using Risk-Based Methodologies to Improve Safety, Cost, and Productivity
August 25	Panel Discussion on Process Safety Competences Journey in the Middle East Region
Aug 27 – 29	2021 India Student Regional Conference
August 29	65 <sup>th</sup> Annual Safety in Ammonia Plants and Related Facilities Symposium
Sept 9	2021 CCPS Canada TSC Meeting
Sept 13 – 14	5 <sup>th</sup> Commercializing Industrial Biotechnology
Sept 13 – 15	10 <sup>th</sup> International Congress on Sustainability Science & Engineering
Sept 14 – 16	Tcbiomass 2021
Sept 15	CCPS Australia Regional Members Virtual Meeting



Sept 21 – 23	3D Bioprinting Conference
Sept 22	September 2021 TSC Meeting
Sept 23	Significance of Management of Change for Effective Risk-Based Process Safety Implementation Workshop
Sept 27 – 29	3 <sup>rd</sup> Enterprise and Infrastructure Resilience Workshop
Sept 29	Pandemic Advance Capabilities & Engineering (PACE): Current COVID Challenge
Sept 29	CCPS India Regional Members Virtual Meeting
Sept 29	Pandemic Advance Capabilities & Engineering (PACE) Workshops
Sept 30 -Oct 1	13 <sup>th</sup> AIChE Southwest Process Technology Conference

## Past VLS Meetings

The VLS records its monthly meetings and archives them on the AIChE Academy website in case you missed a meeting or are looking for a particular topic. See below for current recordings.

Date	Event
Jun 2021	<a href="#">Chemical Fuels in Carbon Neutral Energy system</a>
Apr 2021	<a href="#">Impactful Online Meetings</a>
Feb 2021	<a href="#">Overcoming the Challenge of Applying Chemical Engineering Principles to the Art of Winemaking</a>
Jan 2021	<a href="#">DIERS Technology Fundamentals II: VLS January 2021 Webinar</a>
Nov 2020	<a href="#">Protecting Lives and Livelihood: Hazardous Materials Classification and its Impact to the Supply Chain</a>
Oct 2020	<a href="#">Chemical Safety Board (CSB) Accidental Release Reporting Rule</a>
Sep 2020	<a href="#">Internships and Undergraduate Education</a>
Aug 2020	<a href="#">Physical Property Models to Design Better Chemical Products</a>
Jul 2020	<a href="#">Julia - A Fresh Approach to Technical Computing</a>
Jun 2020	<a href="#">The Next Digital Leap to AI (An Interactive Webinar)</a>
May 2020	<a href="#">Challenges and Benefits of Remote Operator Training using Cloud-Deployed High-Fidelity, First-Principles Based Standard Operator Training Simulators (SOTS)</a>
Apr 2020	<a href="#">NASEM Chemical Engineering in the 21st Century Study: Give your input!</a>
Mar 2020	<a href="#">Is Your Focus Your Magic!</a>
Feb 2020	<a href="#">DIERS data/standards in HAZOPS of two phase flow</a>
Jan 2020	<a href="#">A Brief History of Measurement</a>
Nov 2019	<a href="#">Using Thermal Imaging to Guard Industrial Facilities</a>
Oct 2019	<a href="#">Python for chemical engineers: Getting started</a>
Aug 2019	<a href="#">Reactive Chemical Hazards</a>
Jul 2019	<a href="#">Should I Py or Should I Fortran?</a>
Jun 2019	<a href="#">Design Considerations for Organic Electronic Materials and Devices</a>
May 2019	<a href="#">Why Can't You Compete Without Virtual/Augmented Reality in Your Plant</a>
Apr 2019	<a href="#">The Chemistry of Bourbon: The "spirit" of molecules</a>
Mar 2019	<a href="#">Demystifying Professional Engineering Licensure and How to Put it to Work for you</a>
Feb 2019	<a href="#">Municipal Wastewater and Sludge Are a Resource, Not a Waste: Coping with Tightening Water Supplies and Limited Landfill Availability</a>

## Upcoming VLS Meetings

The VLS has monthly meetings. The following meetings have firm dates and speakers.

Dates	Topic
Sep 2021	Diversity Training Effectiveness
Oct 2021	Don't wake sleeping dragons
Nov 2021	BP's Decarbonization Plan
Dec 2021	Holiday Social

## We're in this Together

The ongoing COVID-19 situation has provided us with a reminder that even in uncertain times, AIChE is a diverse community of people who lead, create, inspire and learn—together. AIChE is here to help. Knowing that many of our members are working virtually, AIChE has created this page to act as a hub for online content, access to communities, and communication updates. [Learn more.](#)

## The Virtual Local Section's Executive Committee

### Officers

Chair:	<a href="#">Paul Adamson</a>
Senior Vice Chair:	<a href="#">Aaron Sarafinas</a>
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Member Feedback	<a href="#">Kirsten Rosselot</a>
	<a href="#">Richard Evans</a>

## Did You Know?

You can visit [the VLS website](#) for more information on the Virtual Local Section's mission, activities, and membership. Also at this website, AIChE student members and VLS members can watch previous webinars for free.

## Subscription Information

Current fully paid members of the Virtual Local Section receive this newsletter. If you wish to update your email address, contact the AIChE's New York Office for Permanent Address Corrections at [xpress@aiCHE.org](mailto:xpress@aiCHE.org) or 1-800-242-4363.

## Continuing Education Credits

Members of AIChE can receive 1 hour of continuing education/professional development credit for attending Virtual Local Section webinars. Send your name, the certificate number on your professional engineer's license, and the licensing entity (state or country) in which you are licensed to our Secretary, [Laura Gimpelson](#), to receive one hour of continuing education credit for attending this meeting.