

August 2023

# GEORGIA PATHWAYS

M A G A Z I N E

**Economist:**  
A STEM Career

**Future Is Bright**  
In STEM

**Dealing With Negativity**  
at school and work

**Fall Education Events**

The Technology Association of Georgia Education Collaborative (TAG-Ed) strengthens the future workforce by providing students with relevant, hands-on STEAM learning opportunities and connecting them to Technology Association of Georgia (TAG) resources. Formerly the TAG Foundation, TAG-Ed is a 501(C)(3) non-profit organization formed by TAG in 2000. Later, the organization's name was re-branded to TAG Education Collaborative to facilitate our role as the leaders for K-12 STEAM education in Georgia.

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Georgia Pathways Magazine services the STEAM education industry needs of the state of Georgia. This magazine is viewed by the consumer with the understanding that the information presented is from various sources from which there can be no warranty or responsibility by the Technology Association of Georgia, the Technology Association of Georgia Education Collaborative and/or their affiliates as to legality, completeness or accuracy.

## **Fall Education Events**

TAG-ED

## **Economist; A Stem Career**

WAYNE CARLEY

## **Superlubricity Coating / ORNL**

DAWN LEVY / ORNL

## **Deal With Negative Attitudes**

JJ DIGERONIMO

## **Computer Science**

THE CODE.ORG ADVOCACY COALITION

## **Future Is Bright For Women**

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Welcome to the August 2023 edition of Georgia Pathways Magazine.



Students often wonder, “Why is math necessary if we’re not destined to be mathematicians?” The answer is simple: math is omnipresent in our daily lives—from purchasing items big and small to budgeting, negotiating a loan, and more. It’s not merely an academic pursuit but an important skill to master. It’s also an indispensable element of STEAM education that drives innovation. And it’s crucial now more than ever to make this connection obvious, with the U.S. ranked 31st in math literacy out of 79 countries.

The beauty of mathematics is that it extends far beyond numbers and formulas—it serves as a universal language enabling us to dissect, analyze, and solve intricate problems on both a global and local scale. When math connects to the larger world, students no longer see it just as an academic exercise, but as a dynamic tool with which to navigate their surroundings and shape their futures.

This approach not only promotes a deeper understanding of mathematical principles but also allows students to draw tangible connections between their lessons and potential career paths. Whether they aspire to design skyscrapers as architects, make groundbreaking discoveries as scientists, or create captivating visuals as graphic designers, a solid foundation in math paves the way towards a wide array of careers.

For educators, the way you teach is often just as important as what you teach. To make math lessons meaningful, try including math in your teachings about history, science, and even language arts. For example, you might have students calculate the number of years since the Cold War or solve word problems with characters from the book they’re currently reading. With this approach, you not only provide a more comprehensive understanding of mathematics and its practical applications but also accommodate a broader range of learning styles.

TAG-Ed offers a variety of opportunities for the next generation to enhance their mathematical literacy. To learn more, please visit <https://www.tagedonline.org/>.

Together, let’s empower students to see math not as a hurdle, but as a powerful tool for their future success.

Larry K. Williams  
President  
TAG / TAG-Ed

Larry K. Williams serves as the President and CEO of the TAG and the TAG Education Collaborative. TAG-Ed’s mission is to strengthen Georgia’s future workforce by providing students with relevant, hands-on STEM learning opportunities by connecting Technology Association of Georgia (TAG) resources with leading STEM education initiatives.

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1 Source: US Bureau of Labor Statistics

## KEY FEATURES



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## Professional Development

With Career Preparation and Technology  
Leadership Pipeline Opportunities



The Georgia AI Manufacturing (GA-AIM) coalition, led by the Georgia Tech Research Corporation, will receive approximately \$65 million to accelerate the adoption of artificial intelligence across the state's legacy industrial sectors. The coalition recognizes artificial intelligence (AI) will soon be a ubiquitous feature of any successful manufacturer.

The GA-AIM coalition will establish the United States as a leader in AI manufacturing while ensuring these systems complement rather than replace existing workers. Coalition members across the state – such as the Technical College System of Georgia, Spelman College, and the Georgia Minority Business Development Agency – will execute projects to expand awareness, training, and job opportunities to underserved communities and businesses.

## Fall 2023 TAG-Ed events:

You will want to take note of and browse the challenging and informative events planned for this fall.

### *Artificial Intelligence for Business*

*Professionals* – August 23, 8:00-10:00 AM

[Learn More](#)

### *Data Science for Business Professionals*

– September 20, 8:00-10:00 AM

[Learn More](#)

### *Generative AI for Business Leaders*

October 11, 8:00-11:00 AM

[Learn More](#)

### *Artificial Intelligence for Business Professionals*

– November 8, 8:00-10:00 AM

[Learn More](#)

### *Data Science for Business Professionals*

– December 6, 8:00-10:00 AM

[Learn More](#)

# Become an Economist

A STEM career field with a variety of choices

By Wayne Carley

Once you understand what economists do from day to day, you'll quickly understand why economics is certainly a varied skill field using an unexpected level of STEM skills daily.

If the workforce and investors of tomorrow are expected to embrace and expand upon financial innovation, they must be exposed to and begin to understand where we are with FinTech, Blockchain and Crypto-Currency.

## ec•o•nom•ics

/ek-nämiks,-ēk-/nämiks/

noun

noun: economics; plural noun:  
economics

1. the branch of knowledge concerned with the production, consumption, and transfer of wealth.
2. the condition of a region or group as regards material prosperity.





Economists study the production and distribution of resources, goods, and services by collecting and analyzing data, researching trends, and evaluating economic issues.

## Job responsibilities

Economists typically do the following:

- Research and analyze economic issues (science)
- Conduct surveys and collect data  
Analyze data using mathematical models and statistical techniques (math)
- Prepare reports, tables, and charts that present research results (creative)
- Interpret and forecast market trends (technologies)
- Advise businesses, governments, and individuals on economic topics (the decision making process of the engineering method)
- Design policies or make recommendations for solving economic problems (creative process and engineering)
- Write articles for publication in academic journals and other media sources (language arts, creative)

Economists apply analysis to issues within a variety of fields, such as education, health, development, and the environment. Some economists study the cost of products, healthcare, or energy while others examine employment levels, business cycles, or exchange rates. Economists often study historical trends and use them to make forecasts. They research and analyze data using a variety of software programs (tech), including spreadsheets, statistical analysis, and database management programs.



Almost 50% of all economists work in federal, state, and local governments collecting and analyzing data about the U.S. economy, including employment, prices, productivity, and wages among other types of data.

They also project spending needs and inform policymakers on the economic impact of laws and regulations.

Corporate economists help them understand how the economy will affect their business, specifically consumer demand and sales to help a company maximize its profits. Economists also work for research firms and think tanks, where they study and analyze a variety of economic issues. Their analyses and forecasts are frequently published in newspapers and journal articles.

This is a very influential career field that is vital to deciding how money and resources are distributed, strategically placed and effectively used. The analysis provided to companies, government and firms could determine the success or failure. Using the engineering method to make such important suggestions and decisions is a critical skill set for success. Whether it is the economics for a department in Washington D.C. or the economics for your personal life, these skills may determine someone's financial future.

## **Types of economists:**

**Econometricians** develop models and use mathematical analyses to test economic relationships. They use techniques such as calculus, game theory,

and regression analysis to explain economic facts or trends in all areas of economics.

**Financial economists** analyze savings, investments, and risk. They also study financial markets and financial institutions.

**Industrial organization economists** study how companies within an industry are organized and how they compete. They also examine how antitrust laws, which regulate attempts by companies to restrict competition, affect markets.

**International economists** study international trade and the impact of globalization. They also examine global financial markets and exchange rates. Labor economists study the supply of workers and the demand for labor by employers.

Specifically, they research employment levels and how wages are set. They also analyze the effects of labor-related policies, such as minimum wage laws, and institutions, such as unions.

**Macroeconomists and monetary economists** examine the economy as a whole. They may research trends related to unemployment, inflation, and economic growth. They also study fiscal and monetary policies, which examine the effects of money supply and interest rates on the economy.

**Microeconomists** study supply and demand decisions of individuals and firms. For example, they may determine the quantity of products consumers will demand at a particular price. Public finance economists study the role of government in the economy. Specifically, they may analyze the effects of tax cuts, budget deficits, and welfare policies. **(creative financing and imagination is a valued asset in this industry)**

## Education requirements

A master's degree or Ph.D. is required for most economist jobs. Students can pursue an advanced degree in economics with a bachelor's degree in a number of fields, but a strong background in math is essential. A Ph.D. in economics requires several years of study after earning a bachelor's degree, including completion of detailed research in a specialty field.

Candidates with a bachelor's degree qualify for some entry-level economist positions, including jobs with the federal government while an advanced degree is sometimes required for advancement to higher level positions.

Most who complete a bachelor's degree in economics find jobs outside the economics profession as research assistants, financial analysts, market research analysts, and similar positions in business, finance, and consulting.

The salaries are great of course, but it doesn't matter how much money you make if you hate your job! Here are some of the best qualities you would need to be the best economist possible:

**Analytical skills.** Economists must be able to review data, observe patterns, and draw logical conclusions.



For example, some economists analyze historical employment trends to make future projections on jobs.

**Communication skills.** Economists must be able to explain their work to others. They may give presentations, explain reports, or advise clients on economic issues. They may collaborate with colleagues and sometimes must explain economic concepts to those without a background in economics.

**Critical-thinking skills.** Economists must be able to use logic and reasoning to solve complex problems. For instance, they might identify how economic trends may affect an organization.

**Detail oriented.** Economists must pay attention to details. Precise data analysis is necessary to ensure accuracy in their findings.

**Math skills.** Economists use the principles of statistics, calculus, and other advanced topics in mathematics in their economic analyses.

**Writing skills.** Economists must be able to present their findings clearly. Many economists prepare reports for colleagues or clients; others write for publication in journals or for news media.

Employment of economists is projected to grow 14 percent from 2012 to 2022, about as fast as the average for all occupations, with the exception of the federal government which is filled to capacity with young economists looking at another 15-20 years of employment, limited new positions availability.

This is one of those STEM career fields that will NEVER go away, regardless of innovation, and if it's just for you, your personal finances will certainly need an effective economist.







*"Are you ready to take your seat at this table and join the conversation?  
**This is a game changer for your tech career."***



The TAG Education Collaborative (TAG-Ed) presents our Pathways to Leadership (P2L) program - a means for providing participants with the best technology skills and leadership development practices on their path to become more successful in challenging environments. You will lead the future of technology by developing your leadership skills through interaction with Atlanta's premier tech executives and innovators. Candidates with 3 to 10 years of management experience, and 1-2 years of leadership will gain knowledge and guidance through this professional development.

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For a detailed program overview, schedule and enrollment, visit:  
<https://www.tagedonline.org/pathways-to-leadership>

### Questions?

Heather Maxfield, Executive Director / TAG-Ed / [heather@tagonline.org](mailto:heather@tagonline.org)

Space is limited -  
**APPLY BY AUGUST 31, 2023**



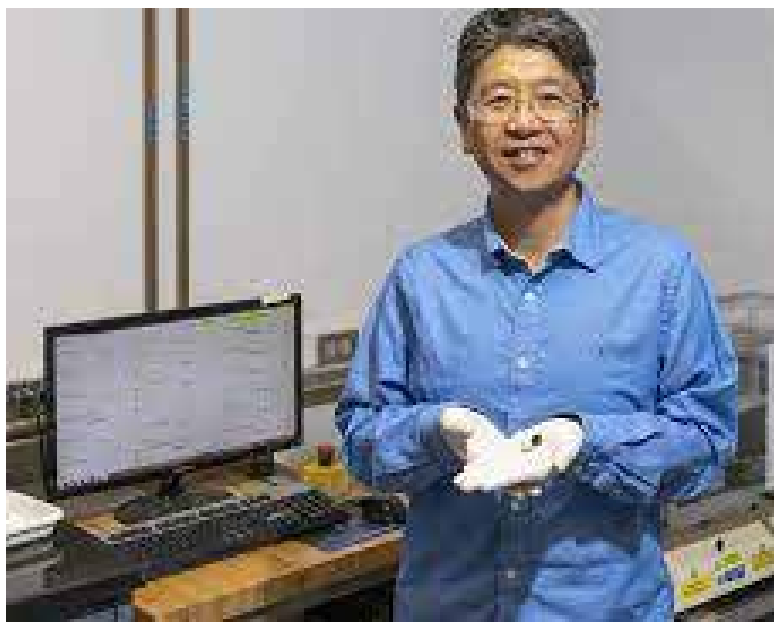
## Superlubricity coating could reduce economic losses from friction wear

By Dawn Levy / ORNL

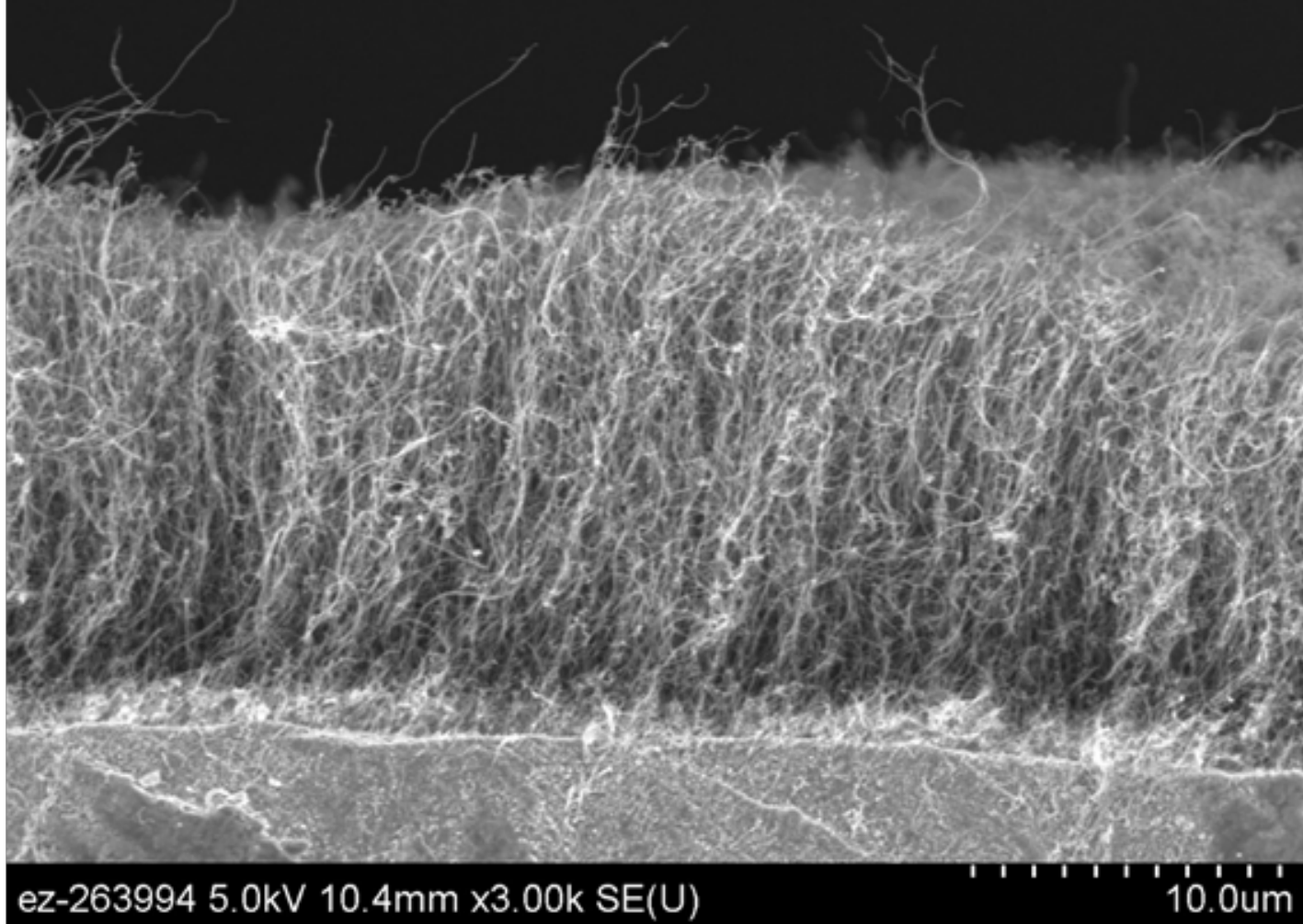
Scientists at the Department of Energy's Oak Ridge National Laboratory have invented a coating that could dramatically reduce friction in common load-bearing systems with moving parts, from vehicle drive trains to wind and hydroelectric turbines. It reduces the friction of steel rubbing on steel at least a hundredfold. The novel ORNL coating could help grease a U.S. economy that each year loses more than \$1 trillion to friction and wear — equivalent to 5% of the gross national product.

“When components are sliding past each other, there's friction and wear,” said Jun Qu, leader of ORNL's Surface Engineering and Tribology group. Tribology, from the Greek word for rubbing, is the science and technology of interacting surfaces in relative motion, such as gears and bearings. “If we reduce friction, we can reduce energy consumption.

If we reduce wear, we can elongate the life span of the system for better durability and reliability.”



Jun Qu of ORNL shows stainless-steel disks before (silver) and after (black) coating with carbon nanotubes that provide superlubricity. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy



ORNL's vertically aligned carbon nanotubes reduce friction to nearly zero to improve energy efficiency. Credit: Chanaka Kumara/ORNL, U.S. Dept. of Energy

With ORNL colleagues Chanaka Kumara and Michael Lance, Qu led a study published in *Materials Today Nano* about a coating composed of carbon nanotubes that imparts superlubricity to sliding parts. Superlubricity is the property of showing virtually no resistance to sliding; its hallmark is a coefficient of friction less than 0.01. In comparison, when dry metals slide past each other, the coefficient of friction is around 0.5. With an oil lubricant, the coefficient of friction falls to about 0.1. However, the ORNL coating reduced the coefficient of friction far below the cutoff for superlubricity, to as low as 0.001.

“Our main achievement is we make superlubricity feasible for the most common applications,” Qu said. “Before, you’d only see it in either nanoscale or specialty environments.”

For the study, Kumara grew carbon nanotubes on steel plates. With a machine called a tribometer, he and Qu made the plates rub against each other to generate carbon-nanotube shavings.

The multiwalled carbon nanotubes coat the steel, repel corrosive moisture and function as a lubricant reservoir. When they are first deposited, the vertically aligned carbon nanotubes stand on the

surface like blades of grass. When steel parts slide past each other, they essentially “cut the grass.” Each blade is hollow but made of multiple layers of rolled graphene, an atomically thin sheet of carbon arranged in adjacent hexagons like chicken wire. The fractured carbon nanotube debris from the shaving is redeposited onto the contact surface, forming a graphene-rich tribofilm that reduces friction to nearly zero.

Making the carbon nanotubes is a multistep process. “First, we need to activate the steel surface to produce tiny structures, on the size scale of nanometers. Second, we need to provide a carbon source to grow the carbon nanotubes,” Kumara said. He heated a stainless-steel disk to form metal-oxide particles on the surface. Then he used chemical vapor deposition to introduce carbon in the form of ethanol so that metal-oxide particles can stitch carbon there, atom by atom in the form of nanotubes.

The new nanotubes do not provide superlubricity until they are damaged. “The carbon nanotubes are destroyed in the rubbing but become a new thing,” Qu said. “The key part is those fractured carbon nanotubes are pieces of graphene. Those graphene pieces are smeared and connected to the contact area, becoming what we call tribofilm, a coating formed during the process.

Then both contact surfaces are covered by some graphene-rich coating. Now, when they rub each other, it’s graphene on graphene.”

The presence of even one drop of oil is crucial to achieving superlubricity. “We tried it without oil; it didn’t work,” Qu said. “The reason is, without oil, friction removes the carbon nanotubes too aggressively. Then the tribofilm cannot form nicely or survive long. It’s like an engine without oil. It smokes in a few minutes, whereas one with oil can easily run for years.”

The ORNL coating’s superior slipperiness has staying power. Superlubricity persisted in tests of more than 500,000 rubbing cycles. Kumara tested the performances for continuous sliding over three hours, then one day and later 12 days. “We still got superlubricity,” he said. “It’s stable.”

Using electron microscopy, Kumara examined the mowed fragments to prove that tribological wear had severed the carbon nanotubes. To independently confirm that rubbing had shortened the nanotubes, ORNL co-author Lance used Raman spectroscopy, a technique that measures vibrational energy, which is related to the atomic bonding and crystal structure of a material.

“Tribology is a very old field, but modern science and engineering provided a





ORNL researchers used a tribometer for friction testing to show that carbon nanotubes in the presence of even one drop of oil could sustain superlubricity over 500,000 cycles. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

material characterization technologies — that’s an ORNL strength. Tribology is very multidisciplinary. No one is an expert in everything. Therefore, in tribology, the key to success is collaboration.”

He added, “Somewhere, you can find a scientist with expertise in carbon nanotubes, a scientist with expertise in tribology, a scientist with expertise in materials characterization. But they are isolated. Here at ORNL, we are together.”

ORNL’s tribology teams have done award-winning work that has attracted industrial partnerships and licensing. In 2014, an ionic anti-wear additive for fuel-efficient engine lubricants, developed by ORNL, General Motors, Shell Global Solutions and Lubrizol, won an R&D 100 award. ORNL’s collaborators were Qu, Huimin Luo, Sheng Dai, Peter Blau, Todd Toops, Brian West and Bruce Bunting. The Vehicle Technologies Office in DOE’s Office of Energy Efficiency and Renewable Energy, or EERE, sponsored the research.

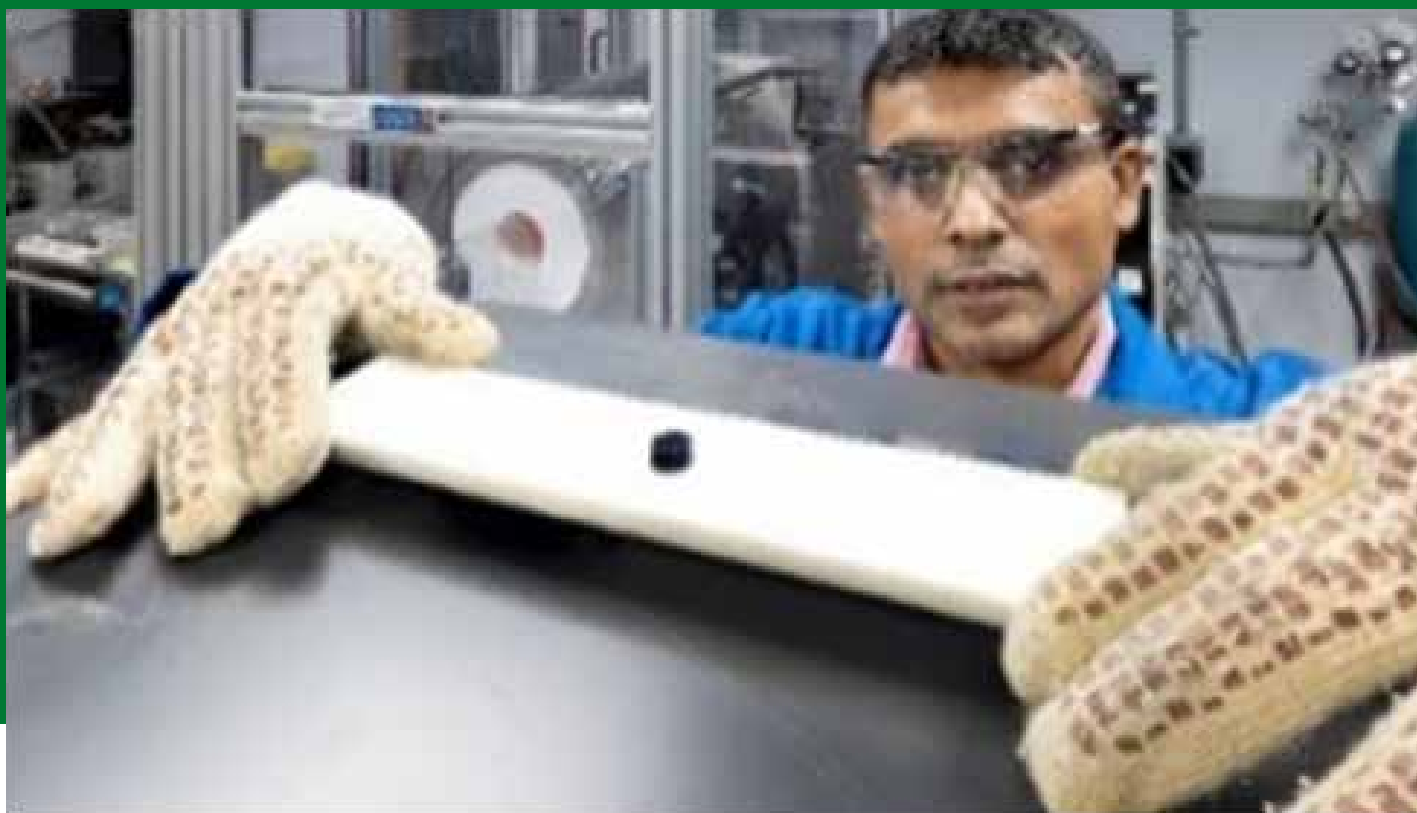
Similarly, the work described in the current paper was a finalist for an R&D 100 award in 2020. And the researchers have applied for a patent of their novel superlubricity coating.

“Next, we hope to partner with industry to write a joint proposal to DOE to



A stainless-steel disk was heated to create iron and nickel oxide particles on its surface. The particles catalyzed carbon nanotube growth during chemical vapor deposition. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

new scientific approach to advance technology in this area,” Qu said. “The fundamental understanding has been shallow until the last maybe 20 years, when tribology got a new life. More recently, scientists and engineers really came together to use the more advanced



Chanaka Kumara of ORNL used a chemical vapor deposition system, in the background, to coat a stainless-steel disc, in the foreground, with carbon nanotubes. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy

test, mature and license the technology,” Qu said. “In a decade we’d like to see improved high-performance vehicles and power plants with less energy lost to friction and wear.” The title of the paper is “Macroscale superlubricity by a sacrificial carbon nanotube coating.”

ORNL’s Laboratory Directed Research and Development Seed Program provided the initial support to the proof-of-concept work. Then the Solar Energy Technologies Office and Vehicle Technologies Office in DOE’s EERE supported the follow-on research.

UT-Battelle manages ORNL for DOE’s Office of Science, the single largest

supporter of basic research in the physical sciences in the United States. The Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit [energy.gov/science](https://energy.gov/science). — Dawn Levy

# *For Teachers and Professionals:* Deal With The Negative Attitudes In School & Work That Threaten Your Career.

**by JJ DiGeronimo**

*President of Tech Savvy Women, author of “Accelerate Your Impact” and “The Working Woman’s GPS” to retain, develop and advance diverse talent in STEM-based organizations.*



We’ve all dealt with people that thrive on their negative attitudes. You hear their name, see their emails or their phone number appear on your cell and your first reaction is to take a deep breath. Her again. Him again. After a deep sigh, you smile and respond as best you can.

However, regular interactions with negative attitudes will take a toll on your own ability to approach your career in a positive light. Their negative aura has a contagious element that will soon permeate your skin.

So how do you deal with the negative attitudes and maintain your focus?

Start by recognizing those that truly do weigh a wet blanket on your day/ life. They are not limited to people you work with – you may actually encounter them at home or in your neighborhood. In my book *The Working Woman's GPS*, there are several exercises dedicated to helping you identify those that are encouraging and supportive versus those that tend to voice their concerns on a regular basis.

As a general rule, you want to surround yourself (when possible) with those that support, encourage and challenge you to do more. Those with negative attitudes are inherently going to bring you down. **This goes for students too.**

In the article *How to Stop 5 Types of Emotional Vampires from Destroying Your Career* by Wanda Thibodeaux, Copywriter, TakingDictation.com, she provides details on these people:

- Antisocials – Addicted to social excitement, freedom and stimulation, easily bored.
- Histrionics – Always putting on a show because they're hooked on attention and approval.
- Narcissists – Will advertise their intelligence and talent and then ignore you once you notice.





- Obsessive-Compulsives – Hyper-vigilant perfectionists who think detail and control will keep them safe.
- Paranoids – Don't accept face value for anything; offer their own version of clarity and truth.

**First** – I recommend you read her article because she not only lists a variety of traits but also what their behavior can and does do to the department/company culture.

It is also fun because I'll bet as you read, you will be able to immediately think of someone who fits those traits. Fore-warned is fore-armed. (caution – are you one of them?)

**Second** – now that you can recognize those that are spreading their negative attitude around in their own unique manner, you can prepare for how to manage the relationship. Reality says that once we've identified them it doesn't mean that we can avoid them. For many of us, they are critical work peers or our boss and in fact, maybe a close family member.

**Third** – identify those that you can minimize your interaction with. If you can steer clear of them, begin to make a plan for doing just that.

**Lastly** – create a plan to keep conversations and relationships on a positive plane. Have you ever walked down the hallway and intentionally smiled and made eye contact with everyone you meet? What happens? Soon, even those with a sour look will begin smiling back. Positive attitudes are just as contagious as negative ones – so start spreading that positive spirit.

In Wanda's article she offers this advice:

*“...although you might not change an emotional vampire, you can beat most of them simply by taking the time to think slowly and rationally about their behaviors and the situation. Keep your cool, avoid knee-jerk responses and keep your eye on your goals rather than what the emotional vampires want you to see.”*



## Senate Bill 108

### Frequently Asked Questions

1. What does the bill say and what are the requirements?

SB 108 is a bill designed to improve teacher capacity in computer science education. By the 2024-2025 school year, all high schools and all middle schools in local school systems should offer a course in computer science. There is a progressive implementation.

School Year	By the beginning of the school year
2022 – 2023	<p><b>High School:</b> Each local system <b>is required</b> to have at least 1 high school offering a course in computer science</p> <p><b>Middle School:</b> All middle schools in the system <b>are required</b> to offer instruction in exploratory computer science</p> <p><b>Elementary School:</b> All in the system <b>are recommended</b> to offer instruction in exploratory computer science</p>
2023 – 2024	<p><b>High School:</b> At least 50% of the high schools in the system <b>are required to</b> offer a course in computer science</p>
2024 – 2025	<p><b>High School:</b> All high schools in the system <b>are required to</b> offer a course in computer science</p>

2. Regarding the legislation, what counts as Computer Science?

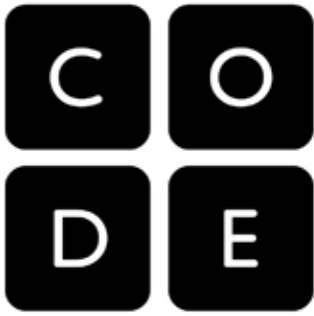
There are 11 High school courses and 3 middle school courses that currently count as Computer Science.

High School	Middle School
<p>AP Computer Science A</p> <p>AP Computer Science Principles</p> <p>Computer Science Principles</p> <p>Introduction to Cybersecurity</p> <p>Advanced Cybersecurity</p> <p>IB Computer Science Year 1</p> <p>IB Computer Science Year 2</p> <p>Embedded Computing</p> <p>Game Design: Animation and Simulation</p> <p>Programming, Games, Apps, and Society</p> <p>Web Development</p> <p>Introduction to Python</p> <p>Coding for Fintech</p>	<p>Foundations of Secure Information Systems</p> <p>Foundations of Interactive Design</p> <p>Foundations of Computer Programming</p> <p>MS Computer Science I</p> <p>MS Computer Science II</p>

3. What is the full language of the legislation?

The full law can be found [here](#).





## Code.org recommends graduation requirements in computer science

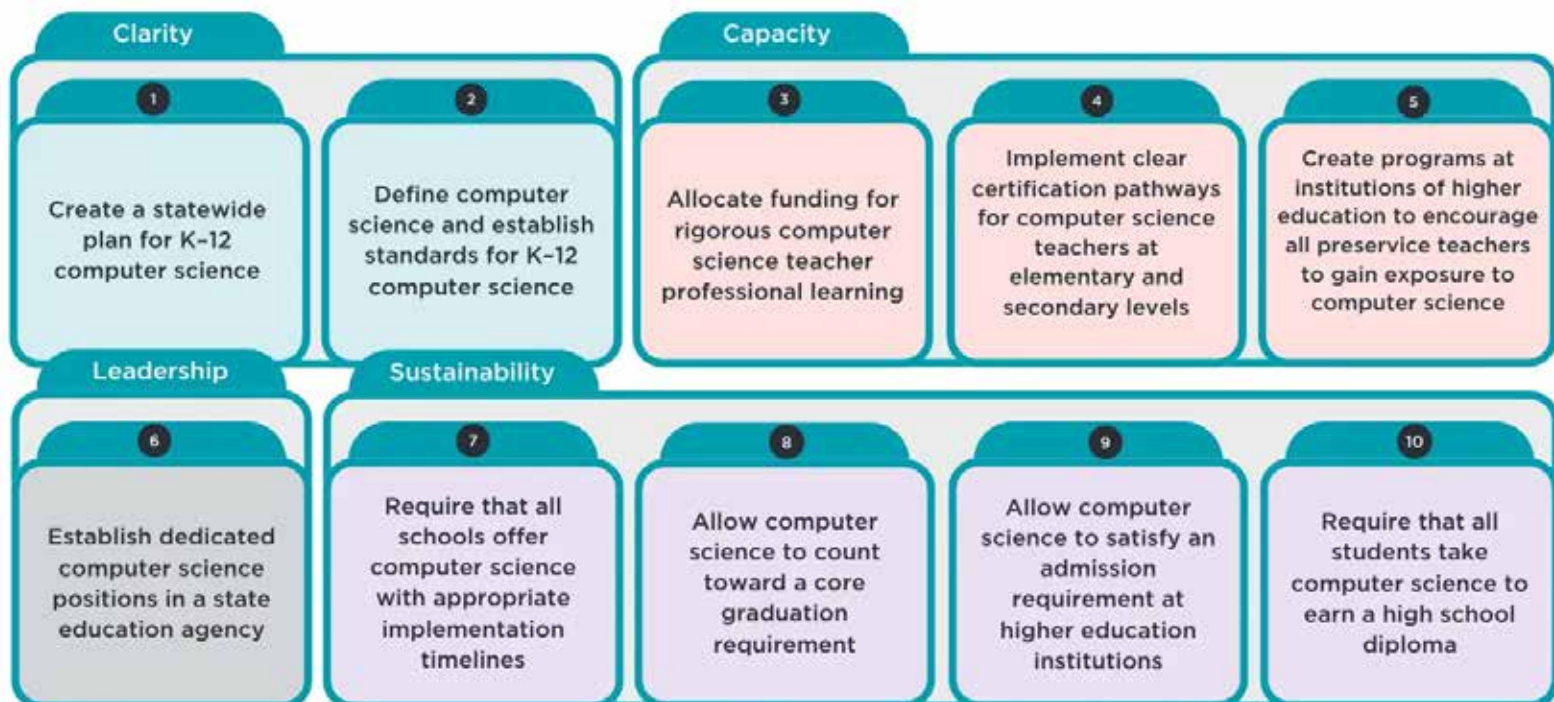
Artificial intelligence has increased the urgency to ensure our students are adequately prepared for a rapidly changing world. It is no longer sufficient for students to know how to use technology; they must be creators and thoughtful contributors. Several states have recognized this imperative and require students to take computer science to graduate high school. Without a graduation policy, we will not be able to ensure all students genuinely have the opportunity to learn computer science.

Code.org is excited to continue building on these early adopters' progress and officially launch our 10th policy recommendation for all states to require all students to take computer science to earn a high school diploma. (Learn more about all of our policies at the bottom of this post.)

For a state to meet this policy recommendation, the state must have:

- A policy that requires all students to earn a credit named “computer science”

### 10 ideas to make computer science foundational to K-12 education:



or has a related name that includes “computer science” to receive a standard diploma for high school graduation,

- A list of courses or standards that satisfy the requirement, all of which must include computer science topics and standards; this list must be available before the graduation requirement goes into effect, and,
- The policy is written down and publicly accessible.

To ensure the success of this policy, states should have multi-year runways, provide targeted support to schools facing challenges in offering computer science, and collect robust data.

Already, seven states have passed such a requirement: Arkansas, Nebraska, Nevada, North Dakota, Rhode Island, South Carolina, and Tennessee.

### **Arkansas' story**

Due to concerted state-wide initiatives, Arkansas has seen significant growth in high school computer science offerings and enrollment over the last eight years. Despite these efforts, the percentage of female students taking computer science in Arkansas remained below 30%, even with more than 90% of Arkansas high schools teaching computer science.

This story is seen nationally; female participation in computer science has been stuck around 30%.

In 2021 Arkansas took a big step to change this persistent narrative by passing Act 414, which requires all students to take computer science to earn a high school diploma, starting with the 9th-grade class of 2022–2023. After just the first year of implementation, the results have been striking. 43% of the 9th graders taking computer science are female; there are more 9th-grade girls taking computer science than 10–12th grade girls combined.

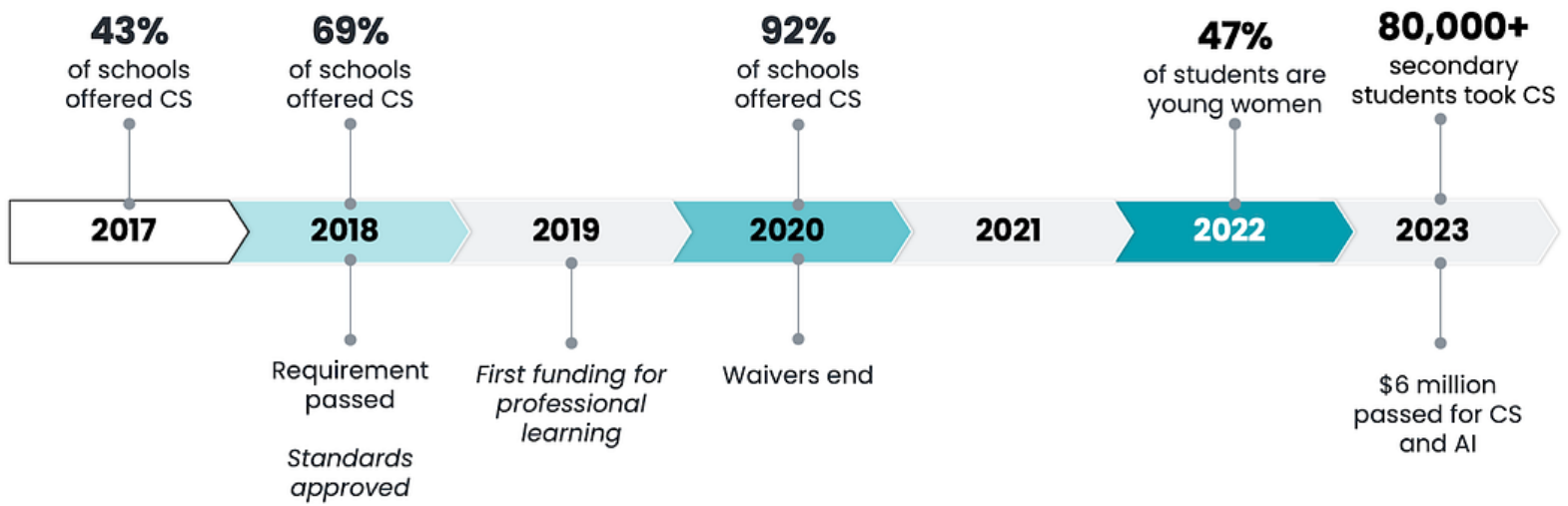
### **South Carolina's Story**

South Carolina has required their students to take a technology course to earn a high school diploma since the 1980s; historically, this was often a typing or computer application class. Starting in 2016, the state began to rethink this requirement to ensure it met 21st-century needs. By 2018 the South Carolina Department of Education modified the existing technology requirement to be a robust computer science graduation requirement, and the results on student participation speak for themselves.

### **Rhode Island's story**

In 2020, the Rhode Island Department





of Education (RIDE) began investigating the high school experience. They looked at transcripts and held open meetings to hear first-hand accounts from students. They drew clear conclusions: many students were not engaged in class and were unprepared for a 21st-century world. RIDE then looked to reform the secondary regulations (graduation requirements) to better meet students' needs.

In November 2022, after several months of public comment and multi-stakeholder collaboration, the Board of Education approved new secondary regulations. These regulations included real-world relevant proficiencies, one of which requires that students must demonstrate proficiency in computer science (starting with the class of 2028).

We are excited to continue spotlighting the progress in all states that have passed graduation requirements, and we look forward to partnering with advocates to increase the number of states with this requirement.

Stay tuned for our 2023 State of CS Report, launching on November 1, with much more data from all 50 states!

— The Code.org Advocacy Coalition

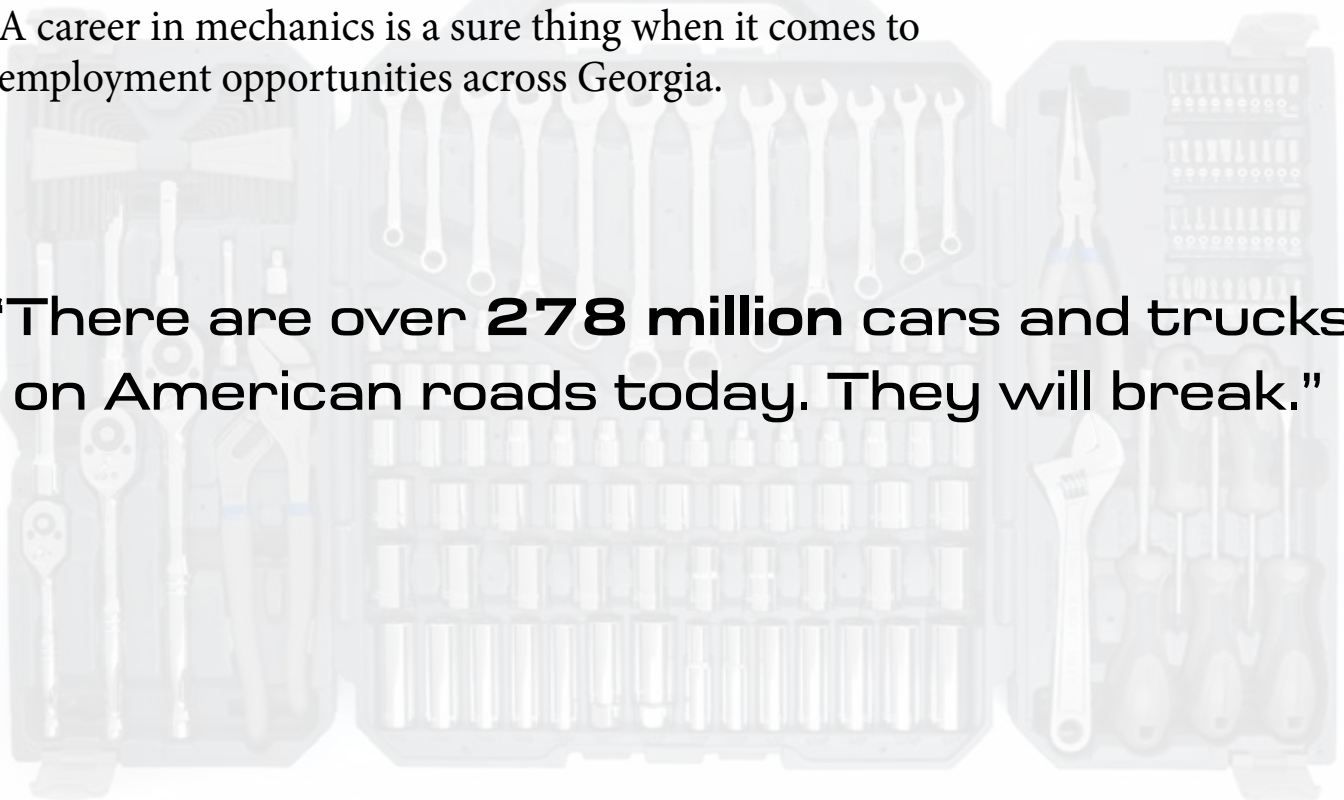


# Mechanic...

## STEM Career

A career in mechanics is a sure thing when it comes to employment opportunities across Georgia.

“There are over **278 million** cars and trucks on American roads today. They will break.”



Auto mechanics is a perfect example of a STEM career that requires all aspects of STEM daily, but with education requirements that range from a high-school diploma, a Technical School diploma, or an apprenticeship. Any male or female who has an interest in automobiles, from changing tires to complex engine computer diagnostics, may find this a very rewarding choice.

Along with engine and power plant application, let's not forget about body work, restoration, design and modification. New materials and compounds are used to repair and replace older parts.

The complexity of new automobiles, truck, construction equipment....basically anything that runs, now requires a new set of skills easily attainable and very affordable.

## *Science / Technology*

Computers and other diagnostic tools are necessary to figure out why the car isn't running correctly and how best to repair it. The use of laptops and handheld devices will be familiar in many ways paving the way for confidence and a positive attitude.





## Engineering

As a reminder, the engineering process is a “decision” making process. Based on the result of your diagnostics, you will have to formulate a series of decisions to best solve the auto problems before you.

You may have occasion to re-route wires, exhaust pipes or other added parts to solve or modify the project. This is a common application of engineering for automotive repair and modification.

## Mathematics

Much of the math for this career is measurement. Tools like a micrometer to measure the brake pad thickness to determine if they need replacing, air pressure gauge to measure tires, shocks, air conditioner freon levels and so forth.

A wide variety of measurements are required from front to back. Much of this math you already know or is common sense. What you don't know, you'll learn and use every day at work. It won't matter if it's a car, truck, motorcycle, boat or electric tech; your mechanical skills will be valued.



There are different “levels” of training for auto mechanics, so the more training and experience you have, the higher the salary. Plan to start at about \$30,000 and with additional training and experience, you could make more than \$50,000 depending on the company.

Many companies, car rental agencies and the government all have their own auto mechanics. You could always start your own company too.

*Get finished with a good Tech. school  
and start your new -*

## STEM Career



# The Future For Women In Science Is Bright

by Astellas Pharma Europe Ltd

I loved school and was fortunate to have several inspiring teachers, in particular in science subjects, so in senior school I went on to study Biology, Chemistry, Physics and Geography.

From here I majored in Pharmacology at University College Dublin, followed by a PhD in respiratory medicine. I am inspired by enthusiastic and engaging people, so teachers who loved their subject and conveyed it with passion were my inspiration. My science subjects were taught by female teachers, and at university, I also had two won-

derful PhD supervisors – both women at the top of their research fields. Their commitment, energy and tenacity inspired my love of science and the belief that I could do well in my chosen field.

At this stage I didn't know much about the pharmaceutical industry until I was interviewed by both Glaxo Wellcome and SmithKline Beecham (now GlaxoSmithKline) at a university recruitment fair. They were scouting graduates for research roles, but I knew from my PhD that I didn't have patience for the repetitive and often



Martina Dempsey,  
VP Commercial Strategy and Operations,  
Astellas Pharma Europe

solitary nature of laboratory experimentation. However, I did love reading around a topic and the storytelling involved in writing and presenting, so working in a science-based industry with a clear purpose and value was extremely compelling.

As a result, I was encouraged to interview for a global regulatory affairs role and joined SmithKline Beecham in their R&D headquarters in the UK. It seemed to me the perfect entry position in that it gave me the opportunity to work as part of a cross-functional team and provided a brilliant insight into the drug development and commercialization process.

### ***What advice do you have for women/girls wanting to get into this industry?***

Go for it! This industry is tremendously rewarding and brings a higher purpose and real meaning to your work. We all have been, will be or know patients who rely on the commitment of the scientific community to continue to innovate and improve lives. It's a privilege to work in an environment where that daily commitment is evident all around us. Science-based skills and experience are important, of course, but what is equally important are your people skills – the ability to collaborate, to be a great team player, to express your views and your ideas with confidence.

So, my advice would be to practice these skills wherever you can by pushing yourself ***outside of your comfort zone.***

### ***As a female in a science-based industry, what changes have you experienced in your career?***

There were always many talented females in the industry but, over the years, we have seen more and more rise to the highest ranks. We now have female CEOs at companies including GSK, Vertex and Merck - all of whom are trailblazers for upcoming generations.

More generally I have witnessed incredible paradigm shifts in healthcare driven by scientific innovation. What were once life-threatening illnesses, like HIV, have become chronic manageable illnesses. Cancer treatments have advanced, improving survival rates and quality of life across many cancer types. And, of course, we saw the rapid development of COVID-19 vaccines that shortened the course of the pandemic and saved millions of lives.

The pace of innovation is truly phenomenal, with the promise of more to come in the shape of potentially curative cell and gene therapies for many difficult-to-treat and life-threatening conditions.

And we also now see amazing things emerging at the interface between technology and medicine, which is an area that Astellas is exploring through our Rx+ division (*prescriptions*).

### ***Where / how do you see the future for women in science?***

I think the future for women in science is very bright. We know that, through efforts by governments and educators, more women are studying STEM subjects in school and higher education. In any industry, having gender balance brings a fantastic diversity of approach, perspective and dynamic to innovation that is to be welcomed at every level. What would you like the future to look like?

For the industry to continue to attract the brightest and the best! As an industry, we have taken huge strides to bring the patient's voice into decision making and I look forward to that evolution. Patients are waiting and there is still much to do in underserved areas including rare diseases, Alzheimer's, motor neurone disease and disease prevention.

Critically, I also hope that governments and payers continue to recognize the immense contributions the pharmaceutical sector brings to society and that they shape their policies to value

the innovation and investment that is the hallmark of our industry.

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*Thank you to Martina Dempsey, VP Commercial Strategy and Operations, Astellas Pharma Europe, for giving us a glimpse into her journey from Ph.D. in respiratory medicine to senior commercial roles in the pharmaceutical industry and her thoughts on why the topic of women in science is so important.*



## Content Invitation

Georgia Pathways™ STEM Magazine requests the privilege of including your content or the content of your students in upcoming issues. This is a great opportunity for students to be published and for educators and industry professionals to share their insights and wisdom regarding careers across Georgia.

If you have questions, please contact the publisher at:

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