The Biologue

Turning Science into Solutions

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Biomanufacturing In Real Life

Dr. Kristina Thiel's Journey Starting Her Own Lab

By Camryn Ward

Picture yourself as a bright-eyed, bushy tailed freshman STEM student at the University of Iowa. You have declared your major in Biology or Chemistry, but this is where your knowledge ends. You have no idea what to do with this degree after graduation and you've only taken entry-level courses at this point. If this sounds familiar, many students have been in this exact position, where the decisions are overwhelming and the path unclear. Dr. Kristina Thiel, an Assistant Professor of Obstetrics and Gynecology at the University of Iowa, had a similar start to her academic career at Samford University in Alabama. Coming from a small town, she was only exposed to certain jobs and hadn't had the opportunities to explore deeper fields of study.

"Through shadowing and opportunities, I realized I was much more interested in how the drugs were made and making better drugs, rather than prescribing existing drugs to patients," Thiel said. "That patient component is always there in my research of cancer."

Thiel began cold-calling people at University of Alabama at Birmingham during the summer between her junior and senior year, looking for lab work. While cold-calling has become less common over the years, the central idea stays the same. Thiel says a personalized email that expresses passion and research sets students apart from those who do not express these interests.

She founded the Kristina Thiel Laboratory Group in June 2022 at the University of Iowa. Its aim is to "[develop] new treatment options for gynecologic cancers using cutting-edge preclinical models of patient tumors". Thiel described her process of beginning her own lab as more non-traditional. Rather than going from PhD programs to post-doctoral training, Thiel worked as a scientific writer for years and co-founded a startup prior to starting a lab. Thiel was awarded a grant to start her lab and it grew from there. There are currently seven researchers assisting Thiel in the lab, and they range from undergraduate and graduate students to senior scientists.

“The quality control and the reproducibility of biomanufacturing is really integral to science right now.”

Thiel said, “My goal overall as an academic researcher is to make an impact on the care of patients with gynecologic cancers.” The Thiel Laboratory Group tests patient-derived organoid models, or tumor tissues, by using different drugs on them to see how they react. Thiel noted that the Thiel Group research is to understand why some patients respond to certain treatments but not others. They are leaders in developing sophisticated methods to ask these questions in the lab.

Many specific scientific processes are used in labs to fuel their success and promote the research that is being uncovered daily. One of the processes that affects the Thiel Group is biomanufacturing. Biomanufacturing is the process of turning living organisms into products for human consumption and use, such as pharmaceuticals, vaccines, insulin, and more. The patient- derived organoid models contain 15-20 ingredients; some of these ingredients have been created through the process of biomanufacturing. “When we trust drugs on the organoid models, we know the changes we’re seeing are because the drugs are having a different effect, not because of the variations in the biomanufactured ingredients.” Thiel said. “The quality control and the reproducibility of biomanufacturing is really integral to science right now.”

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Finding Your Why
Maia McLean Story

The research of the Thiel Laboratory Group has represented many patients and showed how different drugs work among them. Many scientific processes go into developing these treatments that are making a real impact upon the world. Together, Thiel’s research and the scientific findings that shape them improves lives by the day.

Finding Your “Why”

By Josephine Geiger-Lee

In her eighth grade biology class, Maia McLean remembers watching her teacher draw Punnett Squares on the whiteboard. As her teacher explained recessive genes—like being blue-eyed or having red hair—and dominant genes—like both brown eyes and brown hair—it sparked something much larger than a middle school science class.

“My teacher said ‘if you really enjoy this, then you should think about doing genetics or genetic counseling,’” Maia remembers. “And at 14 years old, I thought ‘okay, I know what I’m going to do for the rest of my life.”

It didn’t come without challenges, of course, but now, Maia is a fourth-year undergraduate student at the University of Iowa. She’ll be graduating May 2025 with a biology major, on the genetics and biotechnology track.

After graduation, she hopes to go into genetic counseling—a career focused on helping patients understand and come to terms with their diagnoses and treatments based on genetic workup.

Part of the inspiration for what she wants to do comes from her time at a lab. She had spent time refreshing the Undergraduate Research homepage, hoping to find something that might suit her needs.
While the process may seem intimidating from the outside, Maia explains how the process often looks similar to hers. She went online, and she searched the opening on the website. She even said many of her classmates would send an email to labs they were interested in.

Maia ultimately matched with the Undiagnosed Diseases Program in her junior year. Assigned a pediatrics patient—as most patients with undiagnosed diseases are in pediatrics—she researched what might have been ailing the patient and what might work as treatment.

"I think of the genome as your personal book," Maia says. "I was looking for any mutations—or typos, to continue the book metaphor—and trying to see if that contributed to their disease."

One type of treatment they were looking at was gene therapy. With the help of biomanufacturing, scientists can alter cells, replacing harmful cells with something new. Biomanufacturing also helps develop new technologies that can be used in a lab setting.

After a semester of work, Maia turned her attention back to gene counseling—although she remains grateful for the work done at the lab.

When she looks back at her time at the UI, and thinks about future students entering the field she loves so much, she acknowledges sciences can be daunting. In response, she says: "why not try it?"

"And at 14 years old, I thought 'okay, I know what I'm going to do for the rest of my life."

And, once you've tried it and fallen in love with the sciences, Maia advises future students to find their why. Her personal philosophy relates to the people who need healthcare.

This philosophy is what keeps Maia going, even when studying Glycoylsis at 1 am or facing down five finals spread throughout the week. She connects back to the people she wants to help in the future, and the workload doesn't feel as bad.

Even as she studies, she tries to remember how she'll explain it to patients in the future. While she wants to know the science, she wants to be a great communicator as well.

"My why for loving science is being able to apply it to help other people," says Maia. "If we can't communicate our findings, or what we're learning in our research, or just in our classes, what's the point? If we can't apply it to tell others or the people who have been looking for answers to their questions?"

Ashley Cooney's Path from Student to Faculty

From student to gene therapy innovator — at Iowa

By Klaudia Lukaszczyk

Ashley Cooney, Ph.D., didn't just attend the University of Iowa—she built her entire academic and professional life here. From undergraduate student to postdoctoral scholar, and now a faculty member and 2024–2025 Iowa Innovation Leadership Fellow, Cooney's journey proves that sometimes staying in one place can lead to remarkable growth.

"I was specifically drawn to Iowa because it was an institution where I felt like I could stand out and feel supported in my journey," Cooney said. "It has all the resources of a major university, but in a city that feels manageable and affordable."

As an undergrad, Cooney knew she wanted to pursue medicine, but what truly sparked her passion was learning how therapies are actually developed. That curiosity drove her to pursue graduate studies, focusing on gene therapy for genetic lung diseases, especially cystic fibrosis. Her research at Iowa allowed her to translate science into action, and one of her discoveries—a method of mixing viral vectors with hypertonic saline to enhance gene delivery—a method that "led to a provisional patent with the goal..."

"It's a simple but effective approach," she explained. "You mix the virus with saltwater, and it gets into the lung a lot better than it would without it."

What stood out most to Cooney was Iowa's unique environment. She emphasized the benefits of a large university with ample research opportunities and tight-knit class sizes that supported her learning. In addition, Iowa City's affordability and low-traffic lifestyle made the demanding workload feel more manageable.

Her experience as an Iowa Innovation Leadership Fellow pushed her even further. The program helped her shift from reacting to ideas to actively searching for innovation everywhere. "What the fellowship taught me is to innovate everything in your path. If there's a hurdle, find a creative way around it," she said. "That might mean streamlining a process at your desk or finding new ways to approach problems in the lab."

Biomanufacturing and Gene Therapy

Without biomanufacturing, gene therapy would never be possible.

But what is gene therapy?

Gene therapy is a technique used by scientists and physicians to replace a "faulty" gene (a mutated gene that causes a genetic disease, for example) with a healthy gene. The practice of gene therapy then helps to prevent and cure diseases.

Biomanufacturing is the foundation of gene therapy. From helping to generate tools used in gene therapy, to helping scientists actually replicate and replace genes, biomanufacturing has always been on the front lines.

This mindset—combined with support from Iowa's Cystic Fibrosis Lung Biology Group, a nationally recognized research group—helped her sharpen her research, connect with national collaborators, and gain the tools needed to move discoveries forward.

Cooney's dedication to science extends beyond the lab. She's also a mom of three boys, ages 8, 5, and 3. Balancing motherhood with a research career hasn't been easy, but she credits time-blocking, prioritization, and post-bedtime productivity for helping her manage it all.

"There's not much downtime," she laughed, "but I try to be present at home and efficient at work. And if I need to open my laptop after they go to bed, I do."

Now a faculty member, Cooney has chosen to stay at Iowa—a decision she admits goes against the grain in academia, where moving institutions is often encouraged.

"I had people tell me I'd have to leave to succeed," she said. "But I stayed because I believed in what I was doing here. It worked out because I stayed focused and made sure I stood out."

Her advice to students considering research or science careers is clear and confident: "Start early, stay curious, and find a lab that inspires you. If something doesn't feel right, keep looking. There's always someone out there who can help guide you."

Cooney hopes her story shows that building a successful career at one institution is possible—and that the University of Iowa offers everything students need to thrive, lead, and innovate.

Biomanufacturing in Iowa

Where can I work in Iowa?

By Maddie Hurley

IOWA
Center for Biocatalysis and Bioprocessing

The Center for Biocatalysis and Bioprocessing (CBB) is an academic center whose mission is to educate students and advance research in the biocatalytic sciences. They are focused on providing inclusive and supportive environments for students working towards a career in the biomanufacturing industry.

The CBB manages a biomanufacturing facility in Coralville, Iowa. The facility is equipped to provide a variety of research-based services, all specializing in discovery, scale-up, and production of proteins for research and commercial purposes. They are the bridge between discovery and commercialization, and they offer contract services to the biotechnology sector.

Suppose you are interested in furthering your education in the biotechnology field. In that case, the CBB offers summer internships for undergraduate students as well as an Iowa Biotech Training Program for graduate students. These summer internships offer hands-on experience at the center's biomanufacturing site.

The Iowa Biotech training program offers predoctoral fellowships designed to help students further their bioscience studies as applied to careers in biomanufacturing. Fellowships are awarded to students already in a Ph.D. program at the University of Iowa, and it comes with an annual stipend, internship opportunities, tuition scholarships, and more.

CBB Contact Information:

Phone:
319-335-4900

Email:
biocatalysis@uiowa.edu

Website:
cbb.research.uiowa.edu

FAQ's

What is the best way to gain experience in the biomanufacturing?
Participating in research positions will help you gain relevant, hands-on experience in a lab setting. The Office of Undergraduate Research is a great resource and posts undergraduate research opportunities. If you are looking for specific research opportunities within your department, go to their website and they should have a section with research opportunities.

When should I start looking for lab experience?
End of freshman year, to sophomore year would be ideal, that way you have 2-3 years of undergraduate experience to gain.

What kinds of jobs can I get right out of undergrad in the biomanufacturing field?
With a bachelor's degree you can expect to get an entry-level job in laboratories as an operator or researcher.

Can I get a job in biomanufacturing in Iowa?
This work is already happening in Iowa, so you can stay here and pursue a career in biomanufacturing. Some companies that are central in biomanufacturing in Iowa are the Center for Biocatalysis and Bioprocessing (CBB), Integrated Data Technologies (IDT), UI Pharmaceuticals, Perspective Therapeutics, and Cellular Engineering Technologies (CET).

Scan the code to play online!

Crossword

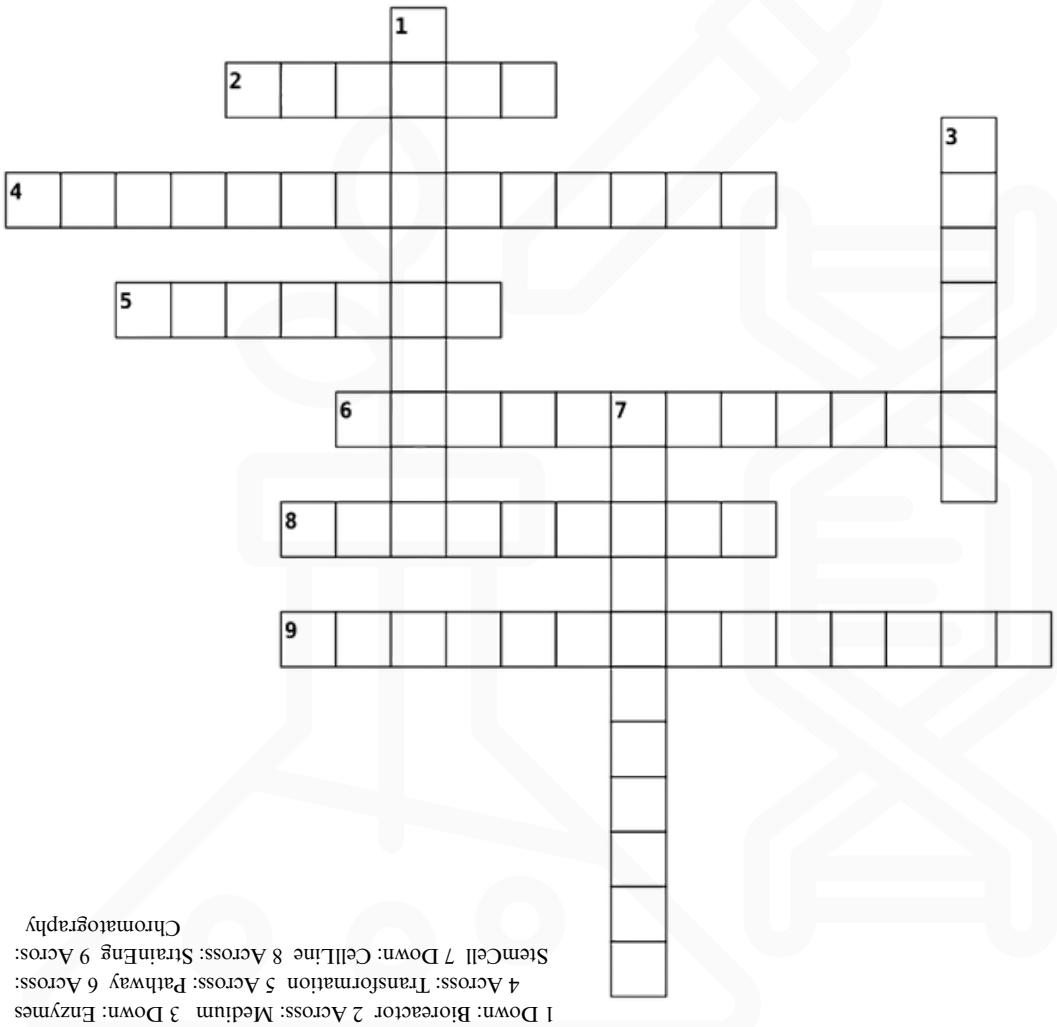
Cracking the Code of Biomanufacturing
Solve below or scan the QR code to play.

Across

2. The nutrient-rich substance used to support cell growth.
4. The process of introducing foreign DNA into a host cell.
5. A series of chemical reactions within a cell.
6. A population of cells with the same genetic makeup used for production.
8. A method to genetically modify microbes for better yields.
9. A key technique used to separate and purify proteins.

Down

1. A vessel used to grow organisms under controlled conditions.
3. Biological molecules that speed up chemical reactions.
7. Technique used to separate proteins based on size and charge.



1 Down: Bioreactor 2 Across: Medium 3 Down: Enzymes
4 Across: Transformation 5 Across: Pathway 6 Across:
StemCell 7 Down: CellLine 8 Across: StrainEng 9 Across:
Chromatography