

# Pharmaceutical biochemistry field expanding



## Michael Shaw.

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This week on Segue, College of Arts and Sciences (CAS) Dean Greg Budzban, PhD, hosts Michael Shaw, PhD, professor of inorganic chemistry in the SIUE Department of Chemistry.

The conversation primarily revolves around a recent National Science Foundation (NSF) grant submitted by Shaw and colleagues in the Department of Chemistry and the School of Pharmacy for a master's degree program in integrative studies focusing on pharmaceutical biochemistry. The team of SIUE professors from both CAS and the School of Pharmacy will utilize innovative teaching mechanisms to cultivate student learning in this cutting-

edge research area.

As this program would offer exceptional new opportunities for students, the discussion focuses on SIUE's budding reputation as a research institution, the importance of pedagogical evolution, potential challenges for the new program, and career opportunities available to students choosing this path.

When discussing his commitment to research collaborations with students, Shaw explains, "As a student, I had the opportunity to do undergraduate research, and it was life-changing. It crystallized what I wanted to do with my life. I probably would not have gone to grad school without it. One of my life goals is to provide others with the opportunities that I had."

He adds that students engaged in research have an upper hand when attending graduate school, which is why he feels the NSF encourages undergraduate research. Budzban agrees, referencing undergraduate research as a defining feature of SIUE and a fundamental part of the University.

Having received research funding since 2002, Shaw emphasizes the outstanding research that occurs on SIUE's campus among the nationally- and internationally-renowned faculty, leading to partnerships with some of the top research institutions in the country.

"One of my collaborators is George Richter-Addo, a researcher at the University of Oklahoma – a big, PhD institution," says Shaw. "I take my students down every summer to work in his lab, and he sends his students to work in my lab. It's not just the big, PhD institution doing outreach to the 'poor, little cousin' undergrad institution – it's a true partnership."

A significant part of the NSF grant is the study of recent pedagogical innovations including peer-led team learning, flipped classrooms, and process-guided inquiry learning at the graduate level. While all of these teaching innovations are in use at the undergraduate level, Shaw and his colleagues will analyze whether these techniques generalize to graduate education. He expresses a strong passion for these innovations, as they drive students to derive solutions on their own and build confidence in their abilities.

“If a professor walks in and provides answers, that shuts down the learning and the conversation,” Shaw explains. “When I work out problems from the book in class, sometimes I come up with the wrong answer. But students point it out. I go back and find, ‘Oh yes, I am wrong,’ and we both learn something. If it’s done in front of the class, that’s a better learning moment for all of us, because they are recognizing a common mistake.”

Budzban is passionate about the topic, citing the negative learning patterns that students fall into due to traditional teaching mechanisms through a particular experience of his own when utilizing innovative pedagogy.

Budzban says, “I was teaching doctorate-level mathematics students who had gone through any number of years of education, and their reaction was, ‘What the heck are we doing? Aren’t we beyond this? Don’t we have the understanding that you’re going to stand at the board and write down the proof of this theorem, and we’re going to sit here and copy it? You stay up there, we’ll stay down here, and everything will be fine! Don’t come near us, don’t interact with us, don’t ask questions, don’t ask us if we have an understanding of the meaning of this.’”

One challenge for the proposed master’s degree in pharmaceutical biochemistry is that it would enroll students from many different scientific and academic backgrounds. The faculty involved will place heavy emphasis on such innovative teaching strategies to bring students to a more level academic playing field.

“We live in a time when the innovations and the skills are needed in interdisciplinary programs,” shares Shaw. “The pharmaceutical biochemistry area is going to bring together people who have chemistry backgrounds, pharmaceutical backgrounds, biologists, medicinal chemists – people with broad ranges of backgrounds. That is a strength and a challenge, because if you have a single pipeline in a discipline, you know what their background is and they can get a master’s degree in it.

“But if there are different pipelines all feeding into the same degree, you’re going to have the problem of students having deep knowledge in their particular content area, but not possessing knowledge that some other students may be taking for granted. We’ll have to use the strength of the group of students to help bring each other up to speed. We’re not just going to throw them in a room and say, ‘Talk to each other’ – we’re going to use these undergraduate teaching innovations to encourage graduate student learning.”

To conclude, they discuss the plethora of career opportunities available to graduates of a master’s in pharmaceutical biochemistry program. “What strikes me is the amount of career opportunities available to graduates in this field,” says Budzban. “They’re almost limitless! There’s going to be a huge number of possibilities.”

Shaw agrees, “We worked with industrial partners on this program. Essentially, what happens in industry is you can be locked into a certain pathway. This type of degree is going to make it easier to switch careers mid-stream.”

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*By Logan Cameron, SIUE Marketing and Communications.*