

# Integrating Emerging and Cross-Cutting Technologies: Biotechnology with Alexandra Gorgevska

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## **SPEAKERS**

Alexandra Gorgevska , Mike Lesiecki

### **Mike Lesiecki**

Our series on the Future of Work is continuing with the focus on integrating emerging and cross cutting technologies. We are hearing from educators on exactly how they are creating changes and new opportunities for learners in partnership with industry. Note that this presentation does not necessarily reflect the views of our sponsor, the National Science Foundation. A video version of this presentation is available on our website, Preparing Technicians dot org. It's my pleasure now to invite Alexandra to the stage and talk about the modifications she's made to her biotechnology program at Palm Beach State. Go ahead, Alexandra. Hi,

### **Alexandra Gorgevska**

Mike, thank you so much for inviting me to participate in this webinar today. So as Mike has already introduced, my name is Alexandra Gorgevska. I'm the department chair for the biotechnology program at Palm Beach State College. Palm Beach State College is the fifth largest college in the state system in Florida. We are the oldest public public state college in the state. We have around 36,000 students and we are a Hispanic serving institution. We have over 130 AS programs. And the biotechnology is biotechnology program is one of those as well a little bit about who I am, where I came from. So just like a lot of people in Florida and transplant. So I'm originally from Michigan, I did all my schooling there. So I went to University of Michigan for my undergrad, I did biochemistry for my major. And then during that time, I had the opportunity to work as a technician in a research lab and a couple of different research labs. So I got the experience that the technician workforce is getting during that time. So I understood the value that I had on my education and the value that it brings to other students educations. I then went on to get my Degree in biochemistry from the Wayne State University, which is in Detroit. And then for my postdoc, I actually went to the National Institute on Aging, and I studied rare premature aging disorders. And so after that I then came to the college. Florida in the early 2000s. There was a big push to bring biotech to the state. And so Jeb Bush was the governor at the time and he really was very supportive of bringing biotech to the State. Florida boasts that it does not have a state tax. So it's very enticing to a lot of companies. And so Scripps Research Institute was encouraged to start a facility in Palm Beach County, which is where Palm Beach State College also resides. So you'll notice that we also have a very large medical device field because we do have a large aging population because people do like to come retire to Florida. So we have a robust medical device company database. And then we also have a lot of other emerging life sciences that also show it highlight some of those industries that are in pockets around the state surrounding many of the universities and colleges. And you'll see that Palm Beach State is highlighted on there. And so we are

the program at Palm Beach State College the biotech program was created in response to Scripps arriving into in the county so we're about a 510 minute drive from the Scripps campus. And last year Scripps underwent a couple name changes that was acquired by University of Florida, so became UF Scripps and then there was a \$100 million donation by Herbert Wertham. So it became the the Herbert Wertham UF Scripps Institute for Biomedical Research and Technology. And it's expanded and it's a wonderful Institute. And also Max Planck came to the area and is also on their same campus. And it's the only the only North American Max Planck Institute. So we're very fortunate to have them right in our backyards. They came here around 2004. So is when Scripps came, and so the Palm Beach state created the biotech program about a year or so after that. And so the program's been around for about 18 years, and I've been with the program for about 16 of those years. So it's been wonderful. We have a lot of business partners. And a lot of those appear on the next slide, where you have a lot of diversity. This one talks about the program. So the program itself was designed as a two year workforce training program. Our AS degree overlaps with the AA degree. So for an extra 14 credit hours, you can graduate with both an AA and an AS, we also have two CCC college credit certificates, one of them is a 30 credit. So it's about a halfway through the program. We use that for students who are more along the lines of a pre med path or some other life science track and they want to get that extra hands on experience. And then we have a 19 credit certificate that is geared more like a postback type of certificate. So we get a lot of students that come to us with a bachelor's degree that is very theoretical, and they lack the hands on skills and our program is very hands on. So we have the 19 credit certificate that we created in response to that. So what you see on the screen here is have a copy of one of the flyers that that we're using most recently. And then if we advance to the next slide, I believe that's the one that has the business partners on it.

**Mike Lesiecki**

You know, as we're looking at this slide, Alexandra, do you have employees come to your program perhaps for that, that one of those shorter certificate as an upgrade of their skills? You mentioned the bachelors people? What about what about employees? Yeah,

**Alexandra Gorgevska**

so we actually do get quite a few business partners who do send their employees to us, or people who have applied to work at our business partners, who were told to come get the 19 credit certificate from us and then reapply. And so we do have this great partnership and a great relationship with our business partners where they send us people to get the additional training. And they know that the training that we that our students gain actually helps our two year degree students out compete many of the four year degree students that are in the market here. So it's a great partnership that we do have internships. So partners take on our interns, we go every lab that we offer has a field trip to a business, a different business partner site each semester. So there are a lot of academic partnerships on here, local business partnerships, networking organizations. So it's really a wonderful partnership that we've developed over the last 16 to 18 years.

**Mike Lesiecki**

They probably like the skills and competencies that your graduates come out with 70 on there, I think so.

## Alexandra Gorgevska

Yeah. And as most, you know, I know that the majority of the audience who's gonna be watching this webinar are from community college and your workforce types of programs. So we're all aware that each of our programs has to have a Business Partnership Council that meets in the fall in the spring. So these people, you know, these companies, these since these Institute's, these are the ones that are driving our curriculum. So they tell us what soft skills, what hard skills the students need, and then we adapt the curriculum from there. You know, in the beginning, it was hard skills were the the big deal, we dealt with our labs, we added more curriculum, we adapted, and then soft skills over the last few years have been a big thing. So we continue to work with them to adapt that, and actually highlights one of the one of the business partners. So AlphaZyme, is a company that was recently acquired by Marvai And they are located here in Jupiter. And their first two employees were alumni from our program. And they have a total of three employees from our program. And when they were acquired by Maravai, that what they like to do at that point is they like to donate to local institutions that help great that workforce. So they selected our biotech program. And they donated \$50,000 to the program a couple months ago. And we were actually able to use that money to upgrade two of our aging instruments, we had an HPLC and an FPLC, that we're both getting a little on in years. So we use that money to purchase two new ones. And the FPLC that we purchase is identical to the one that Alphazyme is actually currently paying for themselves. So it really it's a wonderful partnership, because then we're training them on the same instruments that they're going to be using when they go to these partners. Cool. Yeah, so the way the program is structured, on the left side of the screen, you'll see there are three core courses that we offer on we have an intro to biotech that has a lecture and lab, we have a biotech one, that's all DNA and RNA and Biotech two, that's all proteins. And then we have what I call it our side courses. So we have a cell culture tissue culture class that we do. We have an instrumentation class, which is where those two new instruments are going to be housed. We do an informatics course. And then we have our internship. So for this future workforce training initiative, I selected the intro course, to focus on with the with the cross disciplinary skills. So I believe the next slide has the has that Yeah, so for the cross disciplinary stem core, when I was asked to participate in this CORD initiative, I was really excited about this, because when I looked at the three categories that are included, I looked in there are some really great higher level things in here than skills that students can learn and would be wonderful for them to have. But one thing that stood out to me is spreadsheets. And I know it may sound very elementary to many people, but this is a two year workforce training program. And one thing I've learned is that students don't know how to work with spreadsheets and with Palm Beach State College, our average student age is in their mid 20s. So I can have a student in my class who's a 15 year old high school dual enrollment student, and I can have an eighty year old lifelong learner in the same class. And so they're coming to me with this very diverse backgrounds and what I'm learning is that when it comes time to work on their lab notebooks and to organize their information and their data, they're struggling, they don't know something that could easily be put into an Excel or spreadsheet table is taking six or seven pages in their notebook because they're spreading it out, they don't know how to organize it. So the spreadsheets to me, sort of stood out is even though it's probably one of the simpler items on the list as something that is, I think, an assumed mastery skill, you know, mastered skill that business partners anticipate students to be able to have. So that's the one I focused on. And I believe, then the the, to dive further into that we can move forward. Now,

**Mike Lesiecki**

before we do that, Alexandra, I think you're right, it is an assumption of industry, that technician level people coming in. I mean, they assume that they're going to have some knowledge, maybe call it intermediate skills at Excel, but they assume it, don't they,

**Alexandra Gorgevska**

they really do. And, and I think that as an instructor, you know, I've been doing this for 16 years. But I know that there are certain assumptions that I make about students, you know, the skills that students have coming in. And I know originally, I made the assumption that they would also come in to me knowing from K through 12, how to use spreadsheets and PowerPoint, and your standard Microsoft Office, because I know from family members watching their kids go to school and that sort of thing that they had to give PowerPoints they had to get make spreadsheets, but what I'm finding is they really don't know, they still don't know how to use them. So it's a big deal. But yeah, and it is something that they're expected to be able to do, because a lot of our business partners use digital notebooks. And we still use paper notebooks, because not everybody uses digital notebooks. And not everybody's using the same digital notebook. So we're still using the paper version, but they, they need to know that it's assumed that they know how to use that. So and I don't want them to come in there knowing how to do you know, qPCR and HPLC, but then not be able to organize the data into a simple table to be understand it. Okay, good. And so as part of the adoption for this core, the way that it was presented that I understood was that we had to select first the topic. So I selected the spreadsheets and then figure out how to do the adoption, is it going to be in one class? Is it going to be across several classes. And so I thought for the biotech program, the intro course, is the mandatory prereq for all other biotech courses. So I thought that's the the gateway course. And so that's where I wanted to implement this course. And then we had to figure out, you know, the who, what, when, when, how, and all that. So what I thought was one of our very first experiments in the semester is involves data involves taking pictures of observations, and then organizing that. And previously, they had been doing that I let them figure out their own ways to do that. And it didn't go well. So I thought that first experiments, probably the best spot to put that in. Oh, I have a picture of that on the next slide of one of the main tables. So the intro to biotech course, the lecture is an introduction to the various aspects of biotech, you know, what is DNA, RNA, that sort of thing. And the lab is a two credit lab that meets twice a week. And the very first experiment is, you know, there are no prerequisites for this course, so anyone can take it. And what I found is that I have students who come to me from biotech academies from the high schools who are have a step, you know, they're, they're more skilled, I have career changers who have this information. And I have people who haven't set foot in a science class in 10 years, or ever. So I thought the first experiment in the lab is to teach students how to not contaminate the whole lab. So it's an what we call an aseptic technique lab. And they each student gets five agar plates or petri dishes, and they learn about negative controls positive controls, they learn how easy it is to contaminate and experiment by leaving the lid off of something for a short amount of time for a longer amount of time. And then the impact of touching different surfaces, and then touching an experiment and how easy it is to contaminate so they get five plates, they work with these five plates, and they have to observe them over hours, and then take photos of the progress and then document the observations. And what I have found is that if I do not instruct them to use a spreadsheet to document this data, that this can take 10 different pages, and that the information is all over the place. And the pictures are all sorts of different sizes, some are black and white, some are in color, and you know, and it just ends up being a

nightmare to grade and then also the students come out of it more confused, I think. So the the table in the middle is kind of a sample table. And what I found is when I asked the students to use a spreadsheet to organize the information, if I didn't show them the sample table, the sample table fits on a half a page of a you know, standard sheet of paper. If I didn't provide them with that I had many students tell me that it was impossible to fit it all on one page, because they didn't know how to resize the columns and rows on a spreadsheet. So then I began showing them the sample table and saying, yes, they can be done. And this is how you can do it. So this is where we start implementing it. And it is rough, I will tell you, because not everyone has access to Excel or something comparable, the college does offer free and discounted Microsoft Office access. So I encourage them to take advantage of that discount I tell them they can use whatever spreadsheet software they want. But it's this is the this is the challenges that first implementation, it's because it's also not just the first time they're learning spreadsheets, it's their first time doing an experiment. So it's first experiment, it's the beginning of the semester, they're learning how the lab report format should go, they're learning how to figure out how to use the prescribed lab notebook and all of that. But I have found that even though this is probably the most painful one the semester, that once we survived this one, that the rest are so much easier, and their skills after this improved dramatically, and I will say that some of the challenges in the pros and cons. You

### **Mike Lesiecki**

know, I like that you that you brought this in right at the start. Right? So you set that expectation, okay. And, and, you know, I'm I'm, I'm not that great an Excel user, but I know, the more I use it, the better I get at it. That's not surprising, right? So I'm glad you brought it right in.

### **Alexandra Gorgevska**

So you know, one, you know, part of the process of going through this simple implementation is looking at what are the challenges that we're facing. So one, I don't have the, I want to say luxury, I don't have the luxury of being able to dedicate a whole class period to learning how to use spreadsheets, I don't have you know, we have 61 credit hours that go towards our degree, I don't have any classes I can take out to put in, you know, an Excel course or anything like that. So I have to find a way to fit in, in the timeframe that we have enough of a mini lesson on this. And then to provide resources. So we use Canvas as our learning management system. And I thought that I had a decent amount of resources on that Canvas page. But once I started doing this, I realized I really don't, I have some written instructions on there, I have some links to videos. And I realized that that's something that I need to improve on is to provide more resources. for that. One thing I have noticed, though, is even with the resources I provided students didn't look at them. I asked and they said, Oh, well, I spent, you know, hours on YouTube trying to find videos. And I said, Well, I have some of those videos on the website. And they said I didn't look so. So one of the part of the challenge is providing the resources, but then also making sure that they actually use the resources. But then you know, there's so that time is a factor, making sure that I provide more resources to that will work with the different learning styles, right? You know, some people learn better by visual, some people learn better by reading it. So I'm trying to work on improving the resources that I'm providing. And then one other thing we do is within the program, we have students who are further along in the program, service tutors, paid tutors in the intro courses. So those students also have tutoring sessions outside of class. And what I do is during this timeframe, I ask the tutors to work with the students on spreadsheets, so that they can get some extra input. And

what I found is some of my more senior students they have, they've surpassed the master. So you know, I've taken I minored in business management. So I thought I was fairly fluent in Excel, but so my students are far better at it than I am. So they're doing a great job of tutoring the intro students with that as well. But you know, we do get a diverse, we have a diverse student population. And so there's a huge skills gap between what they know coming in the door, and what they're trying to learn and the amount of time that they have to devote to learning, you know, because many of them are part of the sandwich generation. So they're taking care of their aging parents along with their children. And you know, and then we have some students who are 15 years old, and their mom and dad are dropping them off at the campus. So you know, we've got over there taking the bus. So we have all sorts of different variables that go into this. So I'm trying to provide more equity so that I can provide the resources to meet the needs of the various students that are in the classroom. And that is much easier said than done.

### **Mike Lesiecki**

No, no, you made a good point about the millions of YouTube's probably literally millions of YouTube videos on Excel tutorials. You could you could waste a lot of time trying to find what you need to know. But I like your model of having an experienced student look over their shoulder. I mean, that can really work. So here do this expand that as long as they don't do it for them, of course as opposed to having them do it. But I think that's a good approach.

### **Alexandra Gorgevska**

Yeah, that Some of the conversations I have with my tutors at the start of the semester, because I'll also notice in the lab that they'll start to go get things for the students I said no you are not their personal assistant, you're here to guide them that do it for them. And so that it's, you know, I think that's something that everyone has to overcome in the beginning. But it is true, they, the students who utilize the tutors, because it's a free service for the students and the tutors are getting paid. And so it's a win win. But the students who utilize those tutoring sessions, I immediately see an improvement in their spreadsheets in their lab reports. So that's another resource because peer to peer learning is so valuable, because I can say it, but who am I now? So and then I think the last slide just has just kind of touches based, I borrowed this from UNC, and added a few things to it, you know, with the curriculum, we have to stay relevant. It's an biotech is not a stagnant science, it's not in it's not happening in a vacuum and our industry changes, we have a lot of small companies that start up and some survive, and some don't, we have research institutes, we have a variety of different stakeholders within the program in the community, and the student population is changing. So this just kind of highlights when we're dealing with the workforce development program. Those of you in the audience who are part of those programs, you understand this very well. But we're dealing with things that we can see very clearly, you know, who are the business partners, and then we're dealing with things we can't see very clearly. What are the obstacles that students are facing as they come in? What is that like work life balance? What are the skills that they have? What are the skills they need help with? How much can we help them our time is limited. So I would say for me these office skills, the Microsoft Office type of skills, those are crucial elements that are a little harder to find enough time to implement, because we think if we had a bachelor's degree in this, I would have the ability and the luxury to be able to add those courses. But I'm trying to add those skills in to existing coursework. And I can't take out a lab experiment to focus a whole session on, you know, on spreadsheets, but it's it's finding that balance,

but and AI is another emerging technology that we're starting to address as well. But yeah, so we just keep you know, we keep working with our business partners, we keep working with students to you know, I try to assess what are the skills gaps, what do they know, what do they not know? What do they not realize? They don't know, when they walk in the door? How can we better prepare them? What instruments are relevant, what soft skills are irrelevant, so we just keep getting it's a feedback loop, right? So we just keep getting that feedback and finding ways to implement it and update the curriculum. We don't, we can't always swap things out. So sometimes you're trying to add things in and, and trying to make that work. But, but we're trying so but it's a great opportunity working on myself, it has helped me to realize where I can improve in, in the spreadsheet education aspect.

**Mike Lesiecki**

Alexander, you really given us a good view today of how you actually integrate these things in the realization of what's needed with you and your business, business partners. And then the steps that you took to in bringing this in right at that intro course. I think that was good. Here's a question from the audience. What about data visualization? So Excel, you're you're organizing information in an Excel way. But do you ask your students during the course of it to graph things to to make data more visual? Do you do that? Yes,

**Alexandra Gorgevska**

so we do use the spreadsheets to organize their data and observation section. And then for several of the experiments, they do have to graph information. So we do standard curves when we do later on in that semester. And then also in the subsequent courses, they have to do they do protein quantification assays. So they they make their standard curves, and they have to plot the unknowns against the standards. So they are making graphs of that information. They do enzyme kinetics experiments, so they have to graph it. And then they have to analyze that information, they have to figure out you know, line of best fit the equation of a line, how to manipulate that information, how to present it, how to make a graph, and then how to extrapolate and interpolate the information in the graph. So they do that as well. And then in the program in the lectures, they have to give PowerPoint presentations. And then in labs, they have to create posters, and we do poster symposiums. So they are taking those the visuals that they've created along the way, and then implementing that into further presentations to various presentations.

**Mike Lesiecki**

Excellent. And thank you very much for your comments today. We learned a lot from you, Alexandra. Thank you.

**Alexandra Gorgevska**

Thank you. Thank you for inviting me to do this. I really think it's great. We

**Mike Lesiecki**

heard today how a variety of approaches can be used to integrate emerging technologies into programs. But there are also additional tools and resources available at preparing technicians.org You can read a white paper on the framework itself, and you can download and share and implement cross disk plenary instructional cards. I'll tell you more about those in a moment. You can listen to podcasts

or you could share recordings of webinars like this one. Here are some of those instructional cards. So they're free, they're easily accessible on our website. And you can see here are some examples in that first column data knowledge and analysis. instructional activity cards include data visualization, spreadsheets, we talked about those two things today. And you can see some of the other ones that are listed including automation, robotics, supply and demand issues. So these help faculty to give them learning activities and information to bring something directly into the classroom. Podcasts are also an informative way of upgrading your own personal skills and keeping pace. Our podcast series is illustrated by three of these at the top of the frame, technicians in the new blue economy, Alexandria, sometimes they call that blue tech. Isn't that an interesting term? So

**Alexandra Gorgevska**

yeah, the different color terms Yeah, right. Of

**Mike Lesiecki**

course Internet of Things, and then how to integrate automation into your own program so you can find out more about listening to our podcast series, and of course recordings of this webinar series on using the cross disciplinary STEM core are available. You can find out more about these webinars at Preparing Technicians dot org, thank you again for attending. This concludes our presentation for today.