

# Duke University

DURHAM  
NORTH CAROLINA  
27708-0928

ARTS & SCIENCES COUNCIL  
102 ALLEN BLDG  
CAMPUS BOX 90029

## Minutes of the Regular Meeting of the Arts & Sciences Council

Thursday, December 10, 2015

### Call to Order

**Anita Layton (A&S Council Chair):** Welcome to the last Council meeting of the semester. We have an exciting agenda, so let's get started. Our first business of the day is to approve last meeting's minutes, which have been put on Sakai. So is there any request for correction or amendment? [There being no changes, a motion to approve the minutes was seconded and passed.]

Next, we have Professor David Schaad from Civil Engineering to introduce to us a proposal for the Global Development Engineering certificate. We are not going to vote on this certificate today; that will come in January. Today is your chance to learn more and ask questions. David, the floor is yours.

### Global Development Engineering Certificate Proposal

**David Schaad (Civil Engineering):** Thank you. So I feel like I'm the opening act for DKU and it fits quite nicely, right? Like Anita said, my name is David Schaad and I'm the associate chair and professor of the practice of Civil and Environmental Engineering here at Duke University. I'm a water guy, and so when you think about water, we turn on the tap and we have access to water. So why is it that 1/6<sup>th</sup> of the world – a billion people – don't have access to water? And two billion, or 2/6ths of the world, doesn't have access to improved sanitation. Why does technology work in some places but we can't transport that to other places? And not just that, but sometimes we transport technology and it actually makes things worse. Just think about the Indian subcontinent. We have people dying of cholera, so we will rush in and we will save them by installing wells. Except the problem with those wells is they intersect aquifers that then deliver arsenic to the people trying to drink from them. So we've now exacerbated the problem. So we're trying to do something, and the unintended consequences of that are worse. And it doesn't just happen in the developing world. When we think about the picture on the left, this is Durham pre-NC 147. So we have the Durham Freeway -- of course we want to make it through Durham quickly if we're coming from Raleigh to Greensboro. So we put in the Durham Freeway to make it easy to get from points south and east to points north and west. In the process of doing this, we cut right through the Hayti neighborhood, totally devastating a really rich, cultural and historically significant African American community to the southwest of downtown Durham.

Really, two problems we are thinking about in terms of the intellectual foundation of the certificate are: technology and how do we apply it well? And how do we think about the potential unintended consequences of doing global development, both here and abroad. This (proposal) first started out as a group of engineers, and we had some people from Trinity. We imagined this going through the Engineering Faculty Council, first getting approved for engineers and then if that worked, we'd bring it over to Arts & Sciences and ask your blessing. EFC said that doesn't make any sense, because if Arts &

Sciences approves it, it will, by definition, apply to Pratt. So more than a year ago now, we started the process through Arts & Sciences, and here we are today.

Here is the principle: This is a certificate 1.0, the old model of certificates. We have seven courses. We have a Gateway, and so what we are doing is proposing four Gateways: two in Pratt and two in Trinity. So students will pass through a series of Gateway courses and then will demonstrate global competency through three different courses. There will be a language and culture course, an ethics course and either a policy or economics course. They will have technical depth in one of these three tracks, either water, appropriate technology or energy. The culminating will be one of three different options for a Capstone course. We have Engineering Sustainable Design and the Global Community, Design for the Developing World and Energy and Environmental Design. So students will take seven courses and as part of this, similar to what is required for the Sanford School of Public Policy or for the Global Health Institute, we are requiring an experiential component of at least a month where the students implement what they have designed. So there is a required experiential component but it is not an experiential certificate.

What are the potential issues or concerns? Well, it's an Engineering certificate so one of the concerns is that it is slanted toward Pratt. We recognize that, and it probably is. We expect that a majority of the students that take this will probably be from Pratt, but we don't want it to be exclusively from Pratt. These problems are not just technological. These are problems that run at the intersection of the Humanities, Social Sciences and Pratt. So we really do think this is an opportunity for technically minded Arts & Sciences folks to take a certificate. So someone who's in Chemistry or Biology or has a technical background in Sanford or Nicholas would be interested in this certificate.

There's a concern with hidden pre-requisites. So if you want to take a water course, that means you must take fluids, which means you must take physics. While some of that may be true, there are some pre-requisites for some of these courses ... for one of them, chemistry is a pre-requisite ... and we think that students who are already moving in this direction will already have completed those pre-requisites. So we don't think there are necessarily hidden pre-requisites for the Trinity Students.

Potential bottlenecks and bandwidth concerns. So as you pass through the classes, there are some places where we think students can get clogged up, both at the front end and the back end. We only have three Capstone courses, and we don't really know how popular the certificate will be. Some of these courses, like Designs for a Developing World, that's only going to be open to biomedical engineers. So the Trinity folks and all the other people will be constrained to these other courses. Right now, we don't expect that to be a problem but we are aware. We've talked to the Global Health Institute because they have a similar problem. They have that they would love to offer our certificate to, actually. We think that actually having the four options for Gateways will do that because students who don't know what they want to do will take one of these Gateways and hear about these different options and possibly move in a different direction.

How do you build a cohort with multiple different Gateways and multiple different Capstones? Well the way we are going to do that...

**Chris Walter (Physics):** I'm sorry, could you clarify ... I didn't quite follow you. Let's say there's a Physics student who want to do this. You said they wouldn't be able to take this Capstone class, that only somebody in BME could take it?

**Schaad:** The Designs for a Developing World is only open to BME students, but there are three options for the Capstone. So they would just not be able to take that one, but they would take one of those other two.

**Walter:** Why is it restricted to the BME majors?

**Schaad:** Why is the BME Capstone restricted to BME majors? Because that Capstone is so popular that in order to get into that class, you have to do it by lottery. So there are actually BME majors who can't take that class and actually have to take other BME Capstones.

**Walter:** This is an already existing class and you don't want to overburden it with even more people?

**Schaad:** That's right. So, building a cohort... What we imagine doing is there's going to be an intellectual curiosity around this topic that we already think that students are finding each other. We think by having this certificate and then providing either in concert with the Grand Challenge Scholars Program or different programs around campus, we can sponsor lectures where we force these students to come together and engage intellectually around these topics. So we'll bring them in for dinner either before or after and help to build that cohort feel.

The last topic I'm going to talk about is double counting of courses. Maybe this is probably more true for Pratt students than Trinity, but we have very specific courses that you must take ... this, this, and this. We are counting some of those courses ... well, theoretically you could count all of those courses toward the certificate, but we don't want that. What we want to do is force students outside of their specific major, so we are only allowing students, which I think is consistent with A&S policy, that you only count two courses that are in the certificate and specific, implicit requirements for your major toward the certificate. So they would have to pick something else, maybe in Nicholas. If they are interested in water, they can obviously be civil and environmental engineers, but they'd have to take something over in Nicholas to help fulfill this certificate requirement.

There is support from different units on campus and what I hope is the interesting thing about this topic is a number of years ago, for those of you who were here when we experienced a drought and 46 days of water left in the reservoirs around Durham, is a lot of these problems we have to solve aren't easy to solve. It's not like you can just turn on the tap and we can somehow get more water. These are going to be decade-long problems where we have to get people on board years in advance. So we're trying to do is give engineers, help them understand the aspects that isn't engineering that go into the project. And then we're giving other people – the social scientists and the non-engineers – enough understanding of the engineering background so where this intersection is going to be happening, both near-term and long-term, we're giving them a vocabulary and an understanding of one another to help with this transition.

Do you have any questions?

**Reeve Huston (History):** I actually had a couple of questions. The global competency component: when you say a language and cultures class, does that mean a language is required? Or it could be a language or a Middle Eastern culture class.

**Schaad:** What we are looking for is for demonstrated language proficiency. In Pratt we don't have a language requirement, so this will advantage Trinity students. So they have to have two of three of above, or they have to have an approved culture class that would meet that requirement. So the culture would be a substitute for the language because otherwise there are Pratt students that come in that would never be able to complete this.

**Huston:** I also noticed that the courses and departments listed as part of the certificate program are examples. Are there buy-in from those units and from instructors to be included?

**Schaad:** Yes, so we have letters of support from all the different departments and the directors of undergraduate studies and ostensibly, they've talked with the faculty that are teaching these courses, so yes.

**Huston:** One more question. On the issue of hidden pre-requisites, I thought your answer for all these bottle-neck problems were good, except for this one, in the sense that, especially if you are coming from Trinity, you're not going to necessarily know or have taken them already, and I would just throw out there the suggestion that it would be a very good idea, I think, to have someone ... either the faculty advisor or someone ... to put together a list and regularly update it of what the pre-requisites are for the courses that can be counted towards the certificate so that somebody wandering in from, say, Biology, can know right away and can start planning right away rather than running into a roadblock halfway through.

**Schaad:** Thanks. I can do that.

**Owen Astrachan (Computer Science):** I have a couple questions. One, all these courses that you've got planned already exist, there's nothing new? It's just a repackaging?

**Schaad:** Correct.

**Astrachan:** I don't mean "just" repackaging. It's a beautiful repackaging. In trying to understand, have you done any models? It looks like BME students, they could do this almost for free. They are taking their BME courses anyway, they have a certain number of courses they have to take in Trinity, they can target those and they'll be done. I'm making that up, but you guys should know the real answer to that. Versus students in Trinity. How many could actually do this? When you say, "we don't know many are going to do this," you should be able to have data that says how many could do it.

**Schaad:** A lot, but I don't have numbers. You're right. So we don't allow students to double count, so that's going to be a (inaudible) for all the students in Pratt. The students in Trinity... sure, they are going to have to be wanting to do this. Here's the outgrowth of this. I'm the faculty advisor for a group called Duke Engineers for International Development, Bob Malkin is the faculty director for Engineering World Health. We're seeing students come into our classes that are interested in water, or we're doing projects in Honduras where we're delivering water communities and then we're wrestling with questions of ethics and we're wrestling with questions of sustainability and how do we get community buy-in? So there's a logical outgrowth into the curriculum of some of the things that we've been doing extra-curricularly and we realized we need to formalize this. So that's kind of how this grew out. To answer your question, right now we already have about five to seven students from Trinity a year taking CEE 315/PPS211/ENV356, which is Engineering Sustainable Design and the Global Community. They don't get any credit for that except for credits, and they are already electing to do this. My suspicion is we'll get about that same number who will elect to come over from Trinity and pursue the certificate.

**Astrachan:** You mentioned the capstone BME 462. It doesn't matter who would be allowed to take it because the number of people that want to take it far exceeds supply, which does not appear to be the case as I can tell from a very quick look at these other courses.

**Schaad:** That is correct.

**Astrachan:** So that's where people who wouldn't already be doing this are going to go.

**Schaad:** So what happens if we don't include BME 462 is that no one in BME will take this because we don't have a BME Capstone. Right now, all engineers are required to take a Capstone course.

**Astrachan:** Same thing in the technical track appropriate technology, except I don't understand how you're not going to double count those. There's all these BME courses in that track. Are BME students not allowed to count them toward ...

**Schaad:** They can count up to two. So if I'm a smart BME student, I count the Capstone and I count one other class in the appropriate technology track. Then I have to take something else that would be considered appropriate technology and then all the other courses that I'm taking, I'm taking elsewhere.

**Micaela Janan (Classical Studies):** Regarding the global competency part, the language and culture, would you restrict it to specific languages or would you include any languages under that umbrella?

**Schaad:** I would have to look at what we said inside the proposal. I think the idea was that it would be something that students would be using if they went ...

**Janan:** Well let me make an argument for not being so restrictive. One of our majors has been for more than a decade on a diplomatic mission to South Korea, and one of the reasons she got the job was, they said, "well, you studied one weird culture and language, you could probably do another weird culture and language." It is just a way of inhabiting somebody else's thinking, which seems to be part of the goal of this certificate.

**Astrachan:** It looks from the proposal that it's any course, 203 or higher. Any course. Doesn't matter what language.

**Inge Walther (German):** Micaela, I just wanted to let you know that came up in the Curriculum Committee too, and we argued for broadening along the same lines.

**Karin Shapiro (AAAS):** I have a very similar concern, in fact the same phrasing as Owen, that this is really a repackaging and that you need to formalize it because all students get at the moment is credit. Why isn't that enough? Why do you need...

**Schaad:** Why do we need a certificate? I think it gives us an opportunity at Duke to lead in this area. There's not many other people who have recognized that (inaudible) is headed in this direction. My thinking, Engineering students, DukeEngage, there's so many different things we do at Duke that I think we capitalize on this by packaging it. Do we need to? No, sure. We don't need to.

**Shapiro:** There's surely an employer or some program could see what courses somebody's taken and say, "Okay, this person's interested in water and civil engineering."

**Lee Baker (Trinity College):** I'd love to answer that. This is one of the challenges we've had with all these experiential certificates that many people have been...

**Astrachan:** Although this is not an experiential certificate.

**Baker:** Oh. But the logic still remains, that if the students are doing it anyway, having a formalized program the sort of the trade-off or exchange is that there's better advising, there's more coherence, it's interdigitated, they are actually doing the experiential component not before the Gateway or ... when they

are just doing it on their own, there's not this structured pathway of Gateway to Capstone with experience in between. So that's valuable as opposed to more opportunistic and it all kind of, sort of coming together.

**Schaad:** So we're building a bridge in Rwanda, right? People are going to walk across this bridge, kids are going to walk across this bridge. We want this bridge to be designed well. Doing that volunteer is really hard, but if we incentivize it with a grade, we actually get a pretty good product. If we can incentivize it with a certificate, we get a really good academic experience for the certificate. So yes, you are right. This is an outgrowth of, I've been doing this for 10 years and I've seen every time we can push in different directions, we get a better experience for the students and we get a higher quality product for our community partner, and this mimics what it's like to do development engineering both here and abroad. So I think that's what we're trying to do for our students. Does it need a credential? No, it doesn't need a credential.

**Shapiro:** But then you go to Lee's point. You're saying you're going to have to have a Gateway and the other courses and then the Capstone. What happens if somebody actually is interested in East Africa and says "I'm going to go build a bridge," and comes at this in a different way. Are you saying that that's no longer possible?

**Schaad:** No. As far as the proposal, we have an oversight committee that's going to look at how students are coming into the program, how they're going through this. So ...

**Shapiro:** Well, Lee's saying there's going to be a progression and I'm saying what happens if ... people come into things, into disciplines and intellectual interests in not always a linear fashion.

**Schaad:** Sure, and we expect that. We do expect, and in the proposal we've outlined different requirements in terms of "this" must happen before "this."

**Baker:** And it's staged? Can you take the Gateway and Capstone in the same year?

**Schaad:** No, you can't do that. I don't remember the exact staging but we do have a staging. That came up in the committee...

**Baker:** Could you take your global competency before the Gateway?

**Schaad:** That's possible. Of course, it's language. There might be kids coming in who have their language completed.

**Carol Apollonio (Slavics):** Is there a place in this curriculum for asking whether or not it's a good idea to build a bridge?

**Schaad:** Yes.

**Apollonio:** Where would that happen?

**Schaad:** Hopefully in the access course. Hopefully what we are asking the students to do ... I mean, one of our charges as engineers is the work that we do is supposed to benefit or at least protect public health safety and welfare. A classic example: you're worried about the Maasai tribe in Kenya who is nomadic and it's really dry. So we're going to do a good thing and we're going to go in and build a water system.

So we've built this water system and now you can have a school but now you're not nomadic anymore. Now all of a sudden, you force them to buy fuel for your pumping system that's costing them so much money and then the wells dry up. Now you've made it worse. So we're hoping that students are asking these questions, both in the classes and as part of the preparation, either post or reflecting on the Capstone experience.

**Apollonio:** So that would be mostly in the Capstone?

**Schaad:** Well I know that we do this in the Capstone. I teach CE315/PPS211/ENV356 and we ask that question a lot. "Does this make sense?"

**Chantal Reid (Biology):** The experiential component ... why not make it a Type II certificate? And the other thing is, wouldn't you want to have the impact of your engineering project in the Gateway before you start, as well as in the Capstone.

**Schaad:** So the Gateway obviously comes first, the Capstone comes later. But in some instances, the order of the experiential doesn't make sense. So, using my course as an example, we actually design the things that we then go build. So the experiential component actually comes after. This order isn't actually set in stone, except that we want the Gateway to come first and the Capstone to come last. But the experiential can move around, whatever makes sense for the students and the project. The reason we don't make this an experiential certificate is because of the volume of time that the students are spending. Most of our students aren't going to have whatever the number of hours, and we think that this is important. We think the educational preparation that they are getting is valuable. Not more valuable than the experiences they are getting, but that's why it's not experiential.

**Frances Hasso (Women's Studies):** There are seven courses, plus experience?

**Schaad:** Yes.

**Hasso:** And is that more than most certificates? Most majors are 10 courses, minors are five. Am I missing something? Are most certificates?

**Walther:** I can answer that. There are a number of certificates that require seven and sometimes even eight. For the normal certificate, six is the minimum, but there's nothing that says they can't have more.

**Walter:** I was just wondering, on your next page you had a bunch of the buttons listed, and I was just curious. Many of those departments are not listed as teaching these classes. I'm curious what the relationship between those departments and this program was? It's the first time I've heard about it and I noticed you have Physics listed ...

**Schaad:** So one of your classes is listed either in the technical track or global competency. I don't know which one, I'd have to go back and look.

**Walter:** So is there somebody I should talk to in my department who you talked to about this program?

**Schaad:** I have a letter of support from Physics; I'd have to go back and look, when I got those was over a year ago.

**Walter:** But the connection is that those classes are associated with the technical track. That's the answer?

**Schaad:** For Physics, I would assume yes. Probably something around solar energy is what I'm guessing, but I don't know that.

**Astrachan:** Energy in the 21<sup>st</sup> Century, 127S.

**Schaad:** Thank you.

**Walter:** I see, that's an energy class. I understand. Thank you.

**Layton:** So thank you, David. Next we have Provost Kornbluth and Denis Simon, the Executive Vice Chancellor at DKU, to tell us about the value proposition of the four-year degree at DKU.

## **EXECUTIVE SESSION**