

Here Come the Engineers!



Photo Illustration by Katherine Barnette

FMU's Industrial Engineering program will change the university's profile, provide needed specialists for local industry

By Tucker Mitchell

Dr. Lorna Cintron-Gonzalez, Francis Marion University's first ever professor of Industrial Engineering (IE), knows her field can be a bit difficult for the lay person to grasp. It's engineering, so that means it's complex. Its practitioners work in just about every field of human endeavor there is, which suggests a vague definition. And then there's that 'industrial' part, which even the discipline's top professional group isn't sure is the best title for what this type of engineer does.

But true to the critical skill of IE's everywhere, Cintron-Gonzalez has no problem cutting to the chase and solving this problem.

Just what is an industrial engineer? Simple, says Cintron-Gonzalez. She (or he) is a problem solver.

"When students ask me what it (industrial engineering) is all about, would they like it and so on," says

Cintron-Gonzalez, "what I say is, do you get frustrated in (fast food) drive-thrus? Do you sit there in your car at the drive-thru and say, 'you know, if they just did this it would be better...' Well, if you do that you'd probably like industrial engineering. It's all about solving the problems of everyday life."

FMPSU?

Francis Marion is all set to become Problem-Solving U. The university's new industrial engineering program received final approval from the S. C. Commission on Higher Education in early October, and university officials have been busy ever since prepping for its first group of IE students, who will begin academic work in January.

The program will start small and is unlikely to ever be large, relatively speaking, in terms of enrollment. But make no mistake: it's a big deal, a real game changer for a 44-year-old

liberal arts college. The new program will allow Francis Marion to attract new students, will amplify its role as a friend of Pee Dee industry, and could, at some point, open the door to even more engineering programs at the school.

Says FMU President Dr. Luther F. Carter, "Anyway you look at it - from the perspective of the community, to existing industry, to the workforce, to what it says about the maturity and development of this university - this program is a winner. It's going to make an enormous difference."

Hand in hand

Although Carter praises FMU faculty and staff for the speedy work in bringing the program to fruition - it took barely 18 months from the start of official paper work until the university gained final approval - the decision to head down this path received careful consideration over

a long period of time. The university has engaged in several partnership programs in the field of engineering during its existence, and serious discussions about a standalone program were heard a decade ago. But the talks only hit a serious note in the last two or three years, when a number of factors converged to allow the new program to go forward. Chief among those, says Carter, was the maturation of local industry.

"Certainly a part of the consideration," says Carter, "was that we could not take funds from existing programs to start this, and we needed to grow our student body to a point where it could support what we wanted to do. But the really critical issue was the creation of a core group of businesses and industries in the area that could support the establishment of such a program."

Ironically, that happened as South Carolina and the Pee Dee were coming out of the Great Recession. The expansion of companies like Honda and Johnson Controls, and the arrival of new players, like Otis Elevator, produced the needed momentum.

Of course, that whole process involved a bit of a chicken-and-egg equation. The IE program at FMU gained traction with the advent of new businesses, but at least some of those businesses based their relocation decisions on the advent of an IE program. "It all worked hand in hand," says Carter.

One of a kind?

At the annual faculty breakfast in September 2011, Carter gave faculty a whiff of what was to come when he announced that the college was investigating an engineering degree of some sort. That was essentially the start date for a full-fledged study of the possibilities. A team headed up by Dr. David Peterson, chair of FMU's Department of Physics and Astronomy, dove head first into a feasibility study. By January of 2012, the committee, which also included FMU's Dr. Peter

King and Dr. Susan Peters, had reached a conclusion: It could be done and industrial engineering was the best place to start.

That led to another flurry of activity. New committees were created to develop curriculum and to craft applications to the S.C. Commission on Higher Education and the Accreditation Board for Engineering Technology (ABET), the world's premier accrediting body for engineering programs. Outside help was sought and obtained in the form of Dr. Pat Koelling, associate professor of Industrial and Systems Engineering at Virginia Tech, and a veteran ABET accreditor. Koelling signed on as a consultant, while FMU worked to develop a program. Eventually, he was hired as the program's interim director. He's been spending a couple days every week at FMU while performing those duties.

Physics' Peterson says Koelling proved to be a perfect choice.

"He was extremely qualified," says Peterson, "and, he really wanted to do it."

Koelling says the challenge was impossible for him to resist.

"There aren't that many IE startups of any kind," says Koelling, "and this may be the first time, right here at Francis Marion, where a college has

started an engineering department with industrial engineering. That's exciting to someone like me. Why wouldn't I want to be involved?"

Koelling's shepherding helped FMU push the program past both ABET and the CHE. Peterson's smooth inter-departmental collaboration, plus the regular presence of a very influential party --- Dr. Carter --- made the trains run on time.

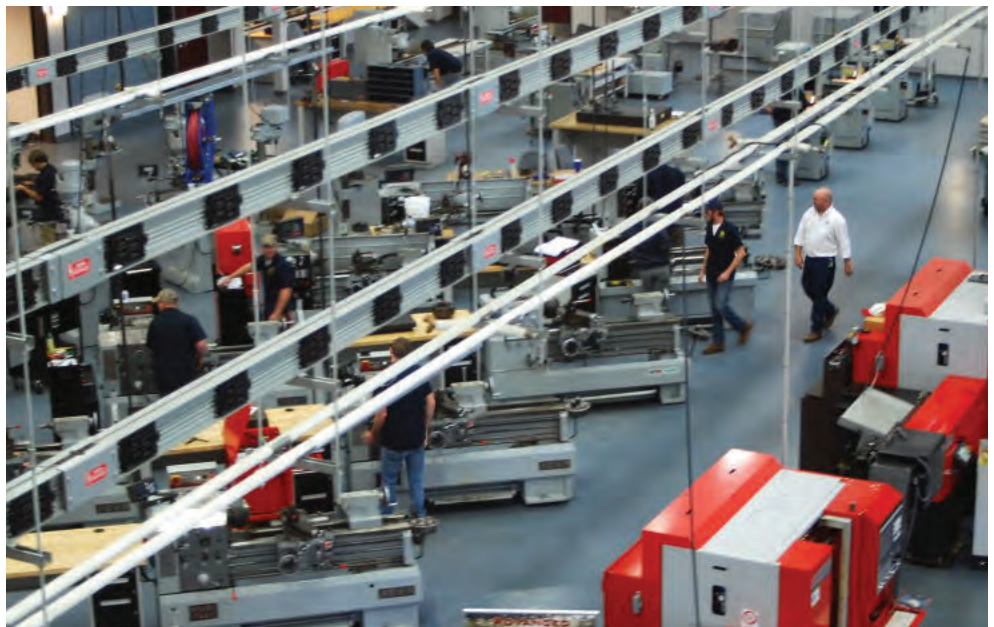
Carter and other university officials worked to locate funding, to cement connections with local industry and, critically, to forge an alliance with Florence-Darlington Technical College (FDTC) and its former president, Dr. Charles Gould, over shared resources. The new program will be a partnership with FDTC. Students will take some lab courses in the Southeastern Institute of Manufacturing and Technology (SiMT) facility at Tech.

"Dr. Carter was involved --- very involved --- every step of the way," says Peterson. "That made a tremendous difference."

TSA, UPS?

Defining the mission of the industrial engineer isn't hard. As Cintron-Gonzalez says, they are, at the most basic level, problem solvers.

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Students in FMU's IE program will use the manufacturing lab at the Southeastern Institute of Manufacturing and Technology on the Florence-Darlington Technical College campus for some classes. FMU is partnering with FDTC to offer the new program.

But explaining just what they do can be complicated because, well, because they do almost everything.

The discipline got its start at the turn of the 20th century, when massive “piece” workshops gave way to brilliantly designed assembly lines; and bright thinkers, like Fredrick Winslow Taylor, began to apply time-motion studies and other analytical tools to industry. Today, industrial engineers fill nooks and crannies across the workplace landscape.

Koelling says industrial engineers are involved in “almost every industry and business you can think of,” but he is stumped – temporarily – when asked to suggest some surprising areas of industrial engineer endeavors.

After a few minutes of thought, however, Koelling rattles off a string of tasks performed by, and occupations filled by, industrial engineers that are surprising, if for no other reasons, because they are so obvious and so diverse. His list includes scheduling air marshals for the Transportation Security Agency, reviewing supply chains for the aerospace industry, seeing to the human-machine interface in hundreds of manufacturing spaces, designing (years ago) what are still the standard procedures for nurses and physicians in an operating theater, curtailing wait times at theme parks (and yes, drive-thrus), and devising routing systems for United Parcel Service.

Koelling’s brow furrows a bit as another example comes to mind.

“I probably shouldn’t mention this,” he says, “but you know those airline ticketing systems that make everyone mad? The ones where they balance load against ticket price and charge you extra for a good seat?... Yep, that’s us (industrial engineers), too.”

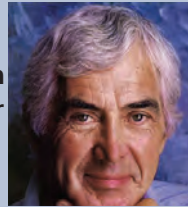
“Industrial engineering,” says Koelling, “is interesting because unlike other engineers we don’t design things. We design, I guess you’d say, processes, or systems. We work with machines and ideas and people. We’re the boundary spanners,

Who, me? An IE?

Industrial engineers find career paths across a broad expanse, as this list of well known IEs suggests.



Tim Cook
CEO, Apple



John DeLorean
Inventor/Entrepreneur



Mike Duke
CEO, Wal-Mart



Joe Girardi
Manager
New York Yankees



Edwin Moses
U.S. Olympic Hurdle
Champion

and while we have to know the math and the science - we’re all full-fledged geeks, just like all engineers – there has to be something else there. You have to be a people person, whatever that means, and you have to understand a broad picture.”

Industrial engineering’s vast scope means it has almost infinite applications. Graduates can be useful in many ways, to many industries, especially in a time when efficiency and productivity are the watchwords of almost every business. That’s one reason the discipline has been singled out for its growth possibilities by the U.S. Bureau of Labor Statistics. The demand for industrial engineers is expected to grow by 14 percent over

the next two decades, according to the Bureau. That’s twice the rate of all other occupations.

And yet, there are already plenty of industrial engineers in the work force. In South Carolina alone, the number of IE’s is pushing 5,000 and state commerce officials predict a thousand more will be needed in the years ahead as the state’s industrial base continues to grow.

At Virginia Tech, Koelling says placement for IE graduates “is almost 100 percent,” and a regular event was grads who had jobs lined up by the end of their junior year. He notes that during the Great Recession, when economic growth slowed dramatically and jobs were hard to find, his IE students continued to get hired.

“There was a drop off in the number of offers they received,” says Koelling, “but the jobs were still there. I think that’s in large part because industrial engineers are needed across the board, in so many fields. In a recession, aerospace or technology might slow its hiring, but health care and government are still rolling along, maybe even ramping up. That kept our students moving (in the job market).”

The average pay is good, too - more than \$74,000 a year in S.C. - although that figure may be skewed by a phenomena that might be called the case of the disappearing engineer. Because industrial engineers handle assignments - solving systemic problems - that are the natural purview of managers and top executives, they often wind up in those very positions. When that happens, their titles no longer include the word “engineer” and so, says Cintron-Gonzalez, “nobody knows they are there. But they are. They (we) are everywhere.”

Geniuses not required

The interdisciplinary work of building an IE program – FMU’s curriculum team included representatives from Physics, Mathematics, and Business – was difficult. But perhaps the most

daunting part of creating the new program will be finding students and convincing them that they can “cut it.” Engineering sounds difficult, and the prerequisites, which include higher mathematics and a healthy dose of physics, aren’t easy. For a liberal arts college making the transition to its first engineering program, that may seem a tall order. But FMU is ready.


Cintron-Gonzalez cites her own example when discussing IE with prospective students. Growing up in her native Puerto Rico, Cintron-Gonzalez was an avid learner who worked hard to keep up with her brother, a mathematical and scientific savant, for whom the academics was child’s play. Cintron-Gonzalez found it much more difficult and remains in awe to this day of natural mathematicians.

“I have never found that (math) to be easy,” says Cintron-Gonzalez “but you don’t have to be a genius to get through it. You just have to get through it.”

And the prospective industrial engineer, the future problem solver, will find a way to do that.

That they might do it at Francis Marion is a source of great hope to Carter. The university’s veteran president believes engineering will be transformative in much the same way a new nursing program was 10 years ago.

“A decade ago, nursing took us down the health professional route, and you see now, 10-11 years later, just what that has produced,” Carter says. “That initial BSN degree has led to several others and has created a wonderful new area for the university.”

“I think you’ll see exactly the same thing happening with engineering,” says Carter. “Give us a decade with that and you will see the development of an engineering program here that will involve a number of different engineering specialties. I’m very hopeful that it will be another area of distinction.” 

Tucker Mitchell is Executive Director of Public Affairs at Francis Marion University.



Dr. Lorna Cintron-Gonzalez in the IE Lab.

Photo by Katherine Barnette

The Face of IE

Dr. Lorna Cintron-Gonzalez joined the Francis Marion University faculty this fall as the assistant professor of industrial engineering. Here’s what you need to know about the first member of the university’s industrial engineering program.

Education: BS, Industrial Engineering, University of Puerto Rico-Mayaguez 2005; MS, Health Systems, Georgia Tech 2006; PhD., Industrial Engineering, Penn State 2013.

Specialties: “My passion is in human factors, accommodating the person to the workplace. But I have come to love all of industrial engineering.”

Why it took so long to obtain her doctorate: “Well, I did stop to have two children while I was going through it...Also, I changed my dissertation topic.”

Family: She is married to Josue Rivera. They have two daughters, Maia Rivera (4), and Zarah Rivera (2).

Courtship: Lorna and Josue met in school in Puerto Rico but there was “no interest” until Lorna went to school at Georgia Tech. Josue, who is also an industrial engineer, was working at a turkey plant in Newberry, S.C. He traveled to Atlanta on weekends to be with some people he knew. One of them was a friend from Puerto Rico. The two reconnected and the rest is history.

Commute: While Lorna was completing her doctorate, Josue worked in Massachusetts. “So, not close, but he was very supportive all the time,” says Cintron-Gonzalez. “I couldn’t have done it without him.”

Why industrial engineering: “I was always in the AP courses in math and science and I was drawn to engineering. After I learned about the different field, industrial engineering was the only one that interested me. It’s just more...fun.”