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**Grad school**  
**GRADUATE PROGRAMS IN CS AND IT**

# Advanced IT degrees lead to top jobs

*Schools want women and minorities for graduate programs*

*Misperceptions can discourage potential students*

By Emily R. Blumenfeld  
Contributing Editor

"Computing and IT have become the fundamental enablers of everything from the high-tech sector to manufacturing to music to publishing. But these industries, and others, need a diverse professional workforce to properly serve our increasingly diverse population," says Dr Yi Deng, dean of the school of computing and information sciences at Florida International University (Miami, FL). "Career choices are endless for qualified minorities and women with a masters or PhD in CS and IT. There is a great vacuum of minorities and women in CS and IT, and at the same time a great demand for them."

Experts agree that despite excellent job prospects, the number of undergraduate majors in CS and related disciplines is dropping across the country, and the pipeline to grad school for women and minorities is drying up.

"To draw more women and minorities into the study of CS and IT, we need a multifaceted approach," says Deng. "We need to expose undergraduates to research and CS career opportunities, build peer support and provide role models. We need partnerships with industry and financial support for grad study."

**Getting past misperceptions**

For women and minorities, an understanding of the current IT and CS job market is also critical.

IT careers "got a bad rep from publicity that focused on outsourcing and the dot-com bust," says Dr Jeffrey Stanton, associate dean of research and doctoral studies at the school of information studies at Syracuse University. "Erroneous stereotypes push students away too. Work in the IT field is thought of as boring and isolating and performed by anti-social nerds."

The perception that CS is oriented toward "techie gadgets and not toward meeting human needs" can turn women away from the field, notes Dr Kay Robbins, professor of CS at the University of Texas-San Antonio. "It's important for women to see how CS professionals design solutions to help solve social problems."

The techie image of CS can turn off students who aim for helping professions like medicine and education, agrees Dr Sherri Frizell, assistant professor and graduate CS program coordinator at Prairie View A&M University (Prairie View, TX). "They don't hear about the CS professionals who are developing applications for people with disabilities, for example."

Changing the perception of CS among parents is vital as well, Frizell adds. "Many minority students are the first in their family to go to college. Parents hear about outsourcing and want their children to go into what they think are safer professional careers."

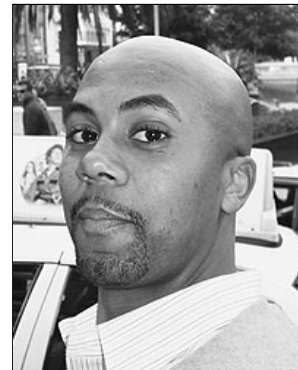
**The benefits of advanced degrees**

Grad school doesn't have to be a money pit, Frizell points out. "There are graduate fellowships that pay for tuition and give students a stipend, and many universities offer financial support to minority grad students."

Today a masters degree is increasingly necessary for the top jobs in industry, and a PhD is



PhD student Angela Dean benefits from female role models and mentors at UTSA.



UC Davis PhD student Lerone Banks: "I've had access to the great minds in CS."



absolutely necessary to teach at a university or to work in a research lab, Robbins stresses.

The grad students profiled here have bucked the trend to pursue advanced CS and IT degrees. They are the future CS and IT professors, researchers and industry leaders who will change the face of the profession.

#### Melinda Agyekum: PhD student at Columbia



Melinda Agyekum.

Melinda Agyekum got her BS in computer engineering from the Georgia Institute of Technology (Atlanta, GA) in 2001. She completed her masters in CS at Columbia University (New York, NY) and went directly into the PhD program there.

"I've wanted to be a university professor ever since I was an undergraduate teaching assistant. And my research experience at Georgia Tech piqued my interest in focusing on problems at a deeper level."

Agyekum received strong support from her parents to pursue her math and science interests. Her all-girl high school encouraged her to explore "technical and more typically male-oriented fields. Fortunately I never encountered anyone who told me I'm not supposed to be good at math or science."

PhD students face high expectations from themselves and others, Agyekum says. But mastering the material is "incredibly rewarding. When you can take a problem that's never been solved and make some headway, even a little nudge, it makes you want to push yourself even further with more challenging problems."

Undergraduate and graduate internships are a great way to get practical work experience, she's found. "People who have corporate work experience tend to analyze and approach problems differently from those who just have classroom training."

She encourages undergraduates to "Do your homework before applying to grad school. Know the area you want to study and how you want to use your degree after you graduate."

"Once there, take advantage of support systems," she advises. At Columbia, Agyekum reached out to NSBE, SWE and a departmental program for women in computer science.

#### Jose Andre Morales: BS to MS to PhD at FIU



Jose Andre Morales.

Jose Andre Morales got his BSCS from Florida International University (FIU, Miami, FL) in 1997. He worked in industry for five years and then returned to FIU for his MSCS in 2004. After that he went into the school's PhD program. "I want to have the highest degree in order to do research, to teach, to make a contribution to the field," he declares.

Work experience is important, he says, but going straight through from undergraduate to graduate school is sometimes best. "The adjustment from a corporate schedule can be difficult. I've also seen a lot of people 'marry' a paycheck after their bachelors degree, and they can't break away."

Morales is grateful for the support he's received in grad school from the dean of the CS program, who is his advisor. Discipline, motivation and independence, as well as a strong network of peers, have also fostered his success. And he's found that a number of private and federal grants are available to him for grad school research if necessary.

"We need more minorities getting graduate degrees in all the sciences," Morales emphasizes. "We definitely need more Hispanic masters and PhD students in computer science."

"I come from a proud Hispanic culture. My parents are from Cuba and I was born in Florida," he says. "Being labeled a minority didn't always sit right with me. But I know that if graduate school helps me reach my goals, people will no longer see me as a minority."

Graduate study "has taught me to be humble and take things in stride," he says. "By presenting my research at conferences and submitting papers for publication, I've learned how to appreciate critiques and feedback. I am continually learning and growing as a doctoral student."

#### FIU's Wei Peng works toward her PhD in CS



Wei Peng.

Wei Peng got her BSCS from Xi'an Polytechnic University (Xi'an, China) in July 2002 and came directly to FIU to study for her PhD.

"The importance of computers in today's society and the way they can help people is truly amazing," she says. "That's why I chose CS as my major when I was seventeen years old and have continued to study it for eight years now."

Job prospects are "exciting and promising," she notes. "The job market for CS is very hot. I see friends who are graduating get great job offers for interesting work."

"With a graduate degree you become a leader and decision maker. You can choose your research areas, provide solutions for companies and educate students."

Her two summer internships at Xerox (Rochester, NY) gave her experience with practical applications. She wants to try both industry and teaching to see which is a better fit for her. "I know I want to do research, either in a company or a university."

"I love my PhD program," Peng says. "I have a lot of support to attend conferences, write papers and concentrate on my research." She appreciates the diversity of her fellow students and the strong focus on recruitment and retention of women. A program in her department, Women in Computer Science, provides peer support and mentoring.

Her ambition to study CS, especially so far from home, has sometimes been difficult for her family and friends to understand. As one of only a few female students she feels additional pressure. "As women we need to work harder," she admits.

"I want to see more women come into CS. Girls should not be scared to study math, science or engineering."

#### **Brian Mulanda is in KSU's masters program**



Brian Mulanda.

Brian Mulanda finished his BSCIS from Washburn University (Topeka, KS) in December 2005 and then went on to graduate school at Kansas State University (KSU, Manhattan, KS) for his masters degree. He plans to pursue his PhD after he completes his MSCS.

"Learning how to do research, to create and produce knowledge, has been really rewarding," he says. "It's exciting to go deep into the concepts, to learn from what other researchers have done, and to try to find better ways to do things."

Mulanda started his studies with a one-year diploma program in business computing. "An internship led to a full-time job after my first year. I was going to school part time, but I knew I needed more training."

He decided that full-time study would be a better route and enrolled at Washburn University, supporting himself with part-time jobs and scholarships. He's thankful that he was able to study full time at Washburn and go directly to graduate school. "I thought if I took a job after getting my bachelors, I might exhaust all my energies at work and perhaps not go back to school. I knew I didn't want to get diverted from my goals of teaching and doing research."

Mulanda appreciates the academic support he's received throughout his higher education. "My undergraduate professors involved me in their research and teaching, helped me attend and present my ideas at conferences, and enabled me to really realize my potential. My KSU professors have helped me to fill in the CS classes I was missing and gain confidence in my research and teaching skills."

He also found that financial assistance was available to help him. "You invite all kinds of support, even from very unlikely sources, when you demonstrate commitment, hard work and humility."

#### **Jolsone John Augustin: MSCS at Prairie View A&M**



Jolsone Augustin.

Jolsone John Augustin graduated from the University of Maryland Eastern Shore (Princess Anne, MD) with his BSCS in 2005. He finished his course work a semester early and got a full-time job as an IT manager on campus, then started graduate school at Prairie View A&M (Prairie View, TX) in August 2005. He interned at Texas Instruments (Dallas, TX) in the summer of 2006 and graduated in August 2007.

"I came here from Haiti in 2000, and I initially wanted to major in international relations to capitalize on my multilingual skills, but I got an undergraduate scholarship for math and computer science. Majoring in CS turned out to be a good decision."

"Graduate school brings a quest for more knowledge. You want to do more and get a deeper understanding of what you're studying."

Even though Prairie View is an HBCU, when he went there he says he was one of very few if not the only full-time black graduate student. He received support through organizations like IEEE and NSBE, as well as from his advisor and Bridge to Doctorate, an NSF-funded program that supports underrepresented minorities aiming for PhD programs in math, science and engineering.

He finds that minorities are sometimes intimidated by the idea of an advanced degree and by the lack of minority faculty at some grad schools. He points out that, "Schools value minority students and put systems in place to support their success. They do their best to retain the minority students they have."

Augustin has no regrets about his graduate study. "An MSCS degree opens new doors. Any

graduate degree gives you more respect, a higher salary and a competitive edge with prospective employers."

Eventually Augustin wants to get his PhD. "I feel a responsibility to give back, to become a professor so that students like me can have a role model who can positively influence their future."

#### Syracuse's K. Matthew Dames is a PhD candidate



K. Matthew Dames.

K. Matthew Dames has a 1990 BS in business administration from Baruch College (New York, NY), a 1995 JD from Northeastern school of law (Boston, MA), and a 2001 MS in library and information science from the school of information studies at Syracuse University (Syracuse, NY). He entered the PhD program in information science and technology at Syracuse in the fall of 2006.

"The most important thing for graduate study is to find your passion," he's realized. "It's the one thing that is necessary and irreplaceable."

Dames has worked in law, music, journalism, library science and computer technology. "I find everything I've done is connected. The wide variety of skills and experiences has been very helpful. You don't know what a situation is going to demand, so the person who can look around and see the links between two seemingly different areas becomes invaluable."

The PhD program brings Dames full circle to his early love of science and math. Even with great support from his parents, he says, "I sometimes shied away from those subjects because so few of my peers were in the classes. I've found a great niche in my doctoral studies and am really enjoying the IT field."

"If you're interested in science, mathematics, engineering or technology and you are a person of color in the United States, there is no better time to follow those pursuits than right now. There is a world of opportunities and options."

He reminds students that studying for a masters degree or a doctorate doesn't mean committing forever to an academic career. "You can use graduate CS and IT degrees in industry, virtually everywhere."

#### PhD student Lerone Banks studies CS at UC Davis



Angelique DiazLerone Banks.

Lerone Banks received his BSCS from Norfolk State University (Norfolk, VA) in 2002. After a year at Fannie Mae (Herndon, VA) he entered the PhD program at the University of California-Davis (Davis, CA). "I always had an interest in teaching," he explains.

Undergraduate internships at Cal Tech (Pasadena, CA) exposed Banks to California life and to the UC-Davis CS department's program in network security.

"The process of creating new knowledge is a tremendous and exciting academic challenge. You have to sort through the wealth of information that already exists and find an area where you can add to the field. You get to find your direction and determine your destiny."

In such a large research institution, he says, "I've had access to the great minds in CS. I've been able to work directly with very knowledgeable and experienced professors."

Too many gifted minority students stay away from math and science, he says. "I find myself spending a lot of time convincing younger students that CS is an option they can pursue for undergraduate and advanced study, and that it's not too hard or out of reach."

Support systems for minority students in graduate school can be very important, Banks offers. The Black Graduate and Professional Student Association at UC-Davis has been invaluable to him.

"A PhD opens doors and removes the ceiling on how far you can go. There are opportunities everywhere that would be out of reach without advanced study."

#### Angela Dean is a UTSA PhD student



Angela Dean.

Angela Dean got her BSCS in 2004 from the University of Texas-San Antonio (UTSA). She worked as a programmer for a large financial services company for seven months before deciding that she too would be happier back in school.

She started on her MSCS in 2006 and applied to the PhD program after one semester. "I knew I definitely wanted to work in research to help advance human knowledge."

The faculty and programs at UTSA are a good fit for Dean's interest in bioinformatics. "In addition to my computer science mentor, I have a co-mentor at the health science center, which has a medical school and cancer research center." She also has strong role models and mentors among the female professors in the CS department.

"It's been rewarding to collaborate with professors on actual research projects," she says. "I enjoy coming up with something new that is useful to other people, and being able to work on problems that haven't necessarily been worked on before.

"A PhD is a long commitment," she reminds undergraduates. "You really need to like your research area, and like spending long hours on one big problem. Applying yourself to an area you find really important and useful makes the process a lot easier. For me it's biology.

"Grad school gives you a lot of freedom," she adds. "You're not quite your own boss since you're working for a faculty advisor, but you're allowed to determine the direction of what you're doing."

She encourages students with a strong math background but not necessarily an undergraduate CS degree to look into an MSCS. "Most people need only a few additional courses to begin grad school. I think people from different backgrounds should give it a try and see if they find it fun."

*D/C*

Emily R. Blumenfeld is a freelance writer located in north-central New Jersey.

### GRADUATE PROGRAMS IN CS AND IT

Check websites for current information.

#### California Institute of Technology

(Pasadena, CA)

[www.cs.caltech.edu](http://www.cs.caltech.edu)

- PhD in CS
- Full time, on campus only

#### Columbia University

(New York, NY)

Fu Foundation School of Engineering and Applied Science Department of CS

[www.cs.columbia.edu](http://www.cs.columbia.edu)

- MS, PhD in CS or computer engineering
- Full- or part-time programs; distance education programs available
- MS can be completed in one year of full-time study

#### Florida International University

(Miami, FL)

School of Computing and Information Sciences

Department of Engineering and Computing

[www.cs.fiu.edu](http://www.cs.fiu.edu)

- MS, PhD in CS
- Thesis and non-thesis options for MS

#### Georgia Institute of Technology

(Atlanta, GA)

College of Computing

[www.cc.gatech.edu](http://www.cc.gatech.edu)

- MS in CS, human-computer interaction, information security, bioengineering, computational science and engineering
- PhD in CS, with concentrations in human-centered computing; algorithms, combinatorics and optimization; bioinformatics
- Graduate certificates in modeling and computer simulation
- Full-time, exchange and study-abroad opportunities; co-ops

#### Howard University

(Washington, DC)

[www.howard.edu/ceacs](http://www.howard.edu/ceacs)

- MS
- Study full time or part time on campus

#### Kansas State University

(Manhattan, KS)

College of Engineering

Computing and Information Sciences

[www.cis.ksu.edu](http://www.cis.ksu.edu)

- MS, PhD in CS
- Thesis, non-thesis and report options for MS

#### Prairie View A&M

(Prairie View, TX)

CS Department

[www.pvamu.edu](http://www.pvamu.edu)

- MSCS, MSCIS
- Two-year thesis or non-thesis programs
- Distance learning available for most courses

#### Syracuse University

(Syracuse, NY)  
 School of Information Studies  
[www.ischool.syr.edu](http://www.ischool.syr.edu)

- MS in information management; telecommunications and network management; library and information science; school media specialization
- PhD in information science and technology
- MS offered part or full time, on campus, on line or combination
- PhD offered full time, on campus

#### **University of California-Davis**

(Davis, CA)  
 Department of CS  
 Graduate Group in CS  
[www.cs.ucdavis.edu](http://www.cs.ucdavis.edu)

- MS, PhD
- Thesis and examination options for MS

#### **University of California-Santa Barbara**

(Santa Barbara, CA)  
[www.cs.ucsb.edu](http://www.cs.ucsb.edu)

- MS, PhD in CS
- Full time on campus

#### **University of California-Santa Cruz**

(Santa Cruz, CA)  
 Baskin School of Engineering  
[www.soe.ucsc.edu](http://www.soe.ucsc.edu)

- MS and PhD in bioinformatics, computer engineering, computer science
- Part-time program available

#### **University of Pennsylvania School of Engineering and Applied Science**

(Philadelphia, PA)  
[www.seas.upenn.edu/grad](http://www.seas.upenn.edu/grad)

- MS in computer and information technology; computer graphics and gaming technology; computer and information science
- PhD in computer and information science
- MS full or part time

#### **University of Texas-San Antonio**

(San Antonio, TX)  
 College of Sciences, CS Department  
[www.cs.utsa.edu](http://www.cs.utsa.edu)

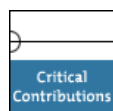
- MS, PhD
- MS offered as thesis and non-thesis project option, or non-thesis course work option

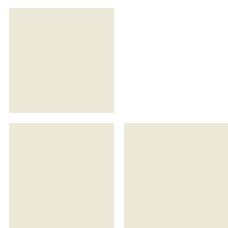
#### **University of Wyoming**

(Laramie, WY)  
 Department of CS  
[www.cs.uwyo.edu](http://www.cs.uwyo.edu)

- MS and PhD in CS
- Full time only

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