

September/October 2017

RESOURCE

engineering and technology for a sustainable world



EXPLORE

How a degree in
**AGRICULTURAL TECHNOLOGY AND
SYSTEMS MANAGEMENT**
could be a perfect fit



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Resource: engineering and technology for a sustainable world (ISSN 1076-3333) (USPS 009-560) is published six times per year—January/February, March/April, May/June, July/August, September/October,

November/December—by the American Society of Agricultural and Biological Engineers (ASABE), 2950 Niles Road, St. Joseph, MI 49085-9659, USA.

POSTMASTER: Send address changes to *Resource*, 2950 Niles Road, St. Joseph, MI 49085-9659, USA. Periodical postage is paid at St. Joseph, MI, USA, and additional post offices.

ADVERTISING: www.asabe.org/advertise.

SUBSCRIPTIONS: Contact ASABE order department, 269-932-7004.

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ON THE COVER:

Lisa Ecker, University of Wisconsin-River Falls study abroad, on a banana plantation in India.

RESOURCE

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September/October 2017

Welcome to our seventh issue of EXPLORE!

Perhaps you are entering a new chapter of your life. Maybe you will soon be leaving home for college, choosing a major, making new friends, searching for a career. Whatever strategy you take or the game plan you make, it just might all come together with ASM. This is a good place to browse, to put the pieces together for your future.

EXPLORE is designed to showcase and encourage the opportunities in agricultural technology and systems management. If you aren't familiar with an ag systems degree, read on! We think you will be impressed with the diverse and interesting possibilities—from hands-on internships and studies abroad to jobs awaiting ag systems graduates. If you have decisions ahead, you may discover that you like what ag systems has to offer.

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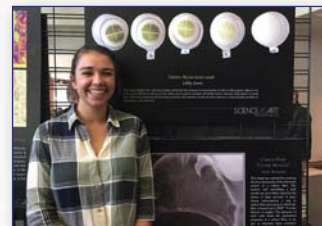
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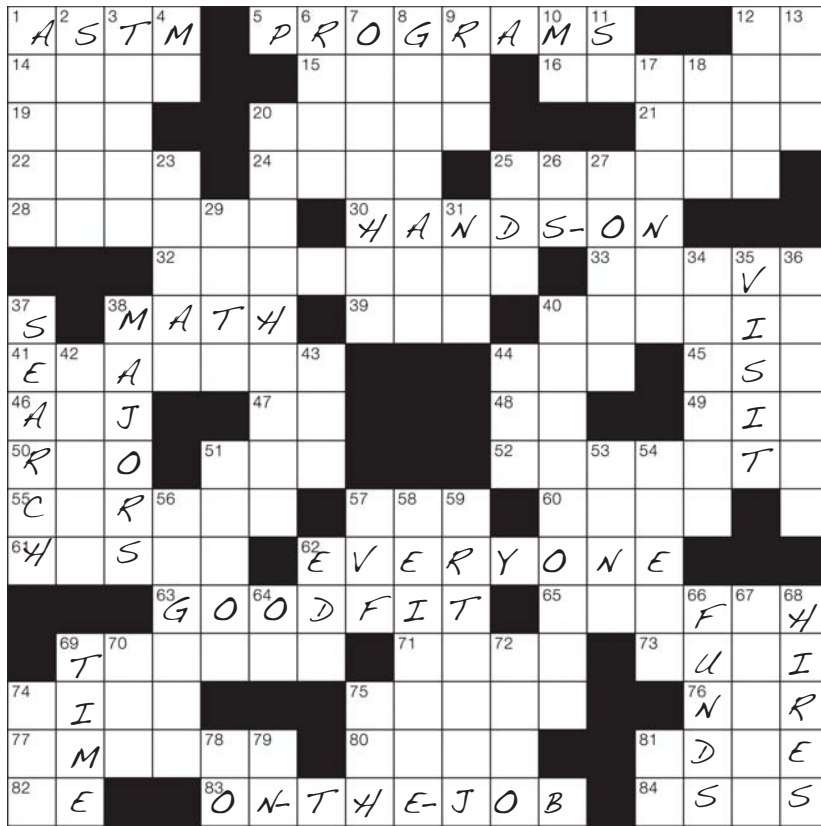
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PUZZLED?

Q&A ABOUT AG SYSTEMS



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ACROSS THE BOARD

1. What is an agricultural systems degree?

An agricultural systems degree combines an understanding of the agricultural, biological, and physical sciences with business, managerial, and technical skills. Graduates with this type of degree find careers in the production and processing of agricultural products into food, fiber, feed and fuel, and the distribution of agricultural products and services. Careers in renewable energy, biofuels, and environmental quality are emerging. Students focus on the application of engineering principles, the study of technology used in agriculture, and the integration of business management concepts in the agricultural and food industries. However, the skills taught in agricultural systems courses are applicable in many industries, and a significant number of students find employment in other industries. This degree is ideal for those interested in technical sales or technical management for an agriculture-related business involved in production, processing, or manufacturing.

5. Why do the university programs have so many different names?

Prior to the early 1990s, most of the programs were simply called agricultural mechanization. Careers for agricultural systems graduates have expanded far beyond mechanization. Many universities have changed the scope of their programs to

focus on emerging technologies as they apply to food, energy, and environmental systems, in addition to traditional agricultural systems. These programs address society's need to efficiently utilize natural resources and protect the environment.

The names reflect the philosophy of the school in responding to these issues. So, although they may have different names, these programs are often quite similar. Program names currently in use are:

- Agricultural and Environmental Technology
- Agricultural Engineering Technology
- Agricultural Operations Management
- Agricultural Systems Management
- Agricultural Systems Technology
- Agricultural Technology Management
- Agricultural Technology and Systems Management
- Bioresources Engineering Technology
- Engineering Technology Program
- Mechanized Systems Management
- Technical Systems Management

Consult the individual universities with questions regarding the direction and focus of their programs.

33. How does a degree in agricultural systems differ from a degree in agricultural engineering?

Today, engineers and agricultural systems graduates both work with the same types of

buildings and equipment, the same crops and animals, the same sensors and computers, and the global society, yet there is a distinct difference in the work they do. The engineer is trained to analyze and design a process, system, or mechanism, while the agricultural systems graduate is able to identify system problems, formulate possible solutions, analyze the impact of alternatives (including social and economic dimensions), and then implement the best solution. Agricultural systems graduates get a broad and basic background in agriculture and the physical sciences, along with courses in business, economics, and management.

When comparing agricultural systems to engineering, you will find that agricultural systems programs are less theoretical and more practical. Emphasis is on hands-on experiences with equipment, and many courses have laboratory sections.

38. What do I need to know to get into the program?

An aptitude for science and math, plus an interest in solving problems, is really necessary for this field. You should also have an interest in electronics, computing, and business management. In high school, prepare well in mathematics, physical and biological sciences, English, and agriculture. Take the most advanced high school courses available to you in these areas and, if possible, take courses such as CAD and information systems. You don't have to be a math wizard to be an agricultural systems student, but mathematics is used a great deal.



62. Do I need a background in agriculture for this major?

No. This curriculum has the flexibility to allow students from rural, suburban, and urban backgrounds to develop a program to meet their personal career objectives.

63. Is this a good option for women and minorities?

This field is a great option for women and minorities. The number of women and minorities entering the field continues to rise.

83. Are internships available?

Yes. This curriculum offers many opportunities for internship work experiences in a variety of companies and organizations. Many experiences are paid internships. For some programs, internships are required for graduation.

GET DOWN TO YOUR OPTIONS ...

35. How can I find out what schools offer programs in agricultural systems?

The schools currently offering agricultural systems programs are listed on page 27. Be sure to check with the school in which you are interested regarding its particular program. Begin your search in the agricultural and biological engineering departments where these programs are typically administered.

37. How do I select the school that is a good fit for me?

The Internet is a great place to begin your search. Many universities provide detailed information about their programs—including course requirements—on their web site. (See page 27 for a list of universities and web sites.) When you have narrowed your choices, visit the top schools on your list. The faculty, staff, and students will be happy to meet with you and show you their facilities. By visiting, you will get a sense of whether their program and setting is right for you.

38. What are the course requirements like in these programs?

There is no single curriculum for ag systems. In fact, they can vary somewhat, but the foundations are similar. ASABE has suggested guidelines: math/science 15%, technical ag 15%, management 15%, ag systems management 15%, humanities/social sciences 10%, and composition/communication 15%. These programs integrate a broad education with expertise in the agricultural sciences, applied technology, and business management. Courses are relevant to all phases of the food, agricultural, natural resources, and environmental industries.

Graduates will be able to integrate and apply advanced agricultural technologies and equipment through student experiences in machine and power systems, computer applications, materials handling, food and materials processing, environmental resources management, electrical/electronic systems, and information/decision support technology. Required coursework balances hands-on knowledge of technology with instruction in agricultural and environmental sciences and agribusiness principles.

Supporting courses provide a foundation of mathematical, chemistry, computer, economic, and communication skills. Computers are used to collect and analyze data and then act on

that information to control machines and processes, in addition to communication and information retrieval. CAD (computer aided design) programs are used to plan equipment and building layouts.

69. How many hours a day will I need to study?

Will I have time for extracurricular activities?

How much time you devote to your studies depends upon you and your expectations. Many colleges say that for every hour you spend in class (often 15 hours/week) you should spend approximately two to three hours studying outside of class. Tougher courses may require more time, easier courses less. Much depends on an individual's ability, attitude, and motivation. That said, students shouldn't be expected to study at the expense of all outside activities. Employers are looking for well-rounded new hires who can balance study with involvement in student activities. You will be able to build your leadership, communication, and organizational skills by being involved in clubs or sports. Most schools have an agricultural systems club. Be sure to check out the ASABE student branch on campus. (See page 30 for more information about ASABE.)

66. Can I afford the education?

Typically, the cost of an agricultural systems education is comparable to most other college programs. These costs will vary depending on the school you choose.

Don't let the cost of higher education prevent you from attending the college of your choice. Most students today need some kind of financial assistance. Numerous types of financial aid are available such as grants and scholarships, loans, work-study programs, and part-time employment. They are available from many sources, including the federal government, state agencies, professional agencies (such as ASABE), and universities. When visiting a school, be sure to stop by the financial aid office to find out what programs the school has to offer.

68. What is the career outlook? What types of companies will I work for?

Agricultural systems graduates are in great demand. Many agricultural systems schools have a placement rate approaching 100%. The starting salaries are highly competitive and are among the highest of college agriculture majors. Employers and career opportunities are vast and varied. You could be working for major equipment manufacturers such as Caterpillar or AGCO, seed and grain companies like Monsanto or ADM, government agencies such as the Natural Resource Conservation Service, or the Peace Corps, companies like Frito-Lay, Toro, ConAgra, or emerging companies in the biofuels industry. Agricultural systems students are also hired by smaller businesses, such as cooperatives, cotton gins, regional manufacturers, and construction companies, to name a few. Or you could start your own business!

The opportunities are endless!

Research and editorial assistance provided by Associate Professor Thomas Brumm, Iowa State University; Professor Joe Harper, University of Illinois; and Professor Stephen W. Searcy, Texas A&M University. Thank you!

PIECING IT TOGETHER



RYAN TIETJE

Field Operations Manager

The Ohio State University

Ag Systems Management, B.S., 2017

Hometown: Deshler, Ohio

Enjoys: welding, wakeboarding, and anything ag



Agricultural Systems Management (ASM) has been a perfect fit for me, and I couldn't be happier with all the major has to offer. I have always had a passion for agriculture, but I wanted to have a better understanding of the whole puzzle. Through my parents' encouragement and the ASM major, all the pieces of the puzzle have come together for me.

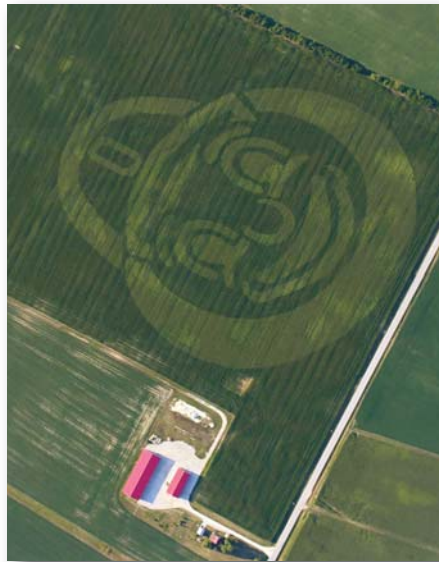
Internships are a critical part of the ASM degree, and I encourage any current or future student to take advantage of as many as possible.

An internship can be seen as a drawn-out job interview. You get a feel for the work as well as the company, and you explore if it's the right fit for you as a future career.

I had three great experiences. My first internship at Legacy Farmers' Cooperative focused on different agronomy tasks: application of plant protection products, seed inventory, and creating variable-rate fertilizer prescriptions. My second internship was through INTL FCStone, a risk management group that trades different commodities: corn, soybeans, wheat, gold, silver, and cardboard. My last was with Archbold Equipment Company. I worked alongside managers and

salesmen responsible for inventorying parts, fixing precision technology, and installing guidance systems on Case IH tractors, combines, and sprayers. From these internships, I learned what I really wanted in an ag career—one that may eventually return me home to my family farm.

In addition to undergrad classroom education, I worked as a research assistant for the Precision Ag Department at OSU. I was exposed to some of the latest and greatest equipment the industry has to offer and was fortunate to assist with research projects—compaction trials, high-speed planting, tracks versus tires (on grain carts and planters), and multi-hybrid planting. A favorite project was designing an aerial view of "Brutus" in a cornfield for the 2016 Farm Science Review. Using two corn hybrids with different color tassels, we illustrated that two hybrids could be planted simultaneously and accurately enough to create a detailed image of



the OSU mascot. With this research, we hope to plant hybrids based on soil type or productivity in areas with the highest return on investment. Thanks to ASM, every day I love what I do.

CONNECTING THE DOTS

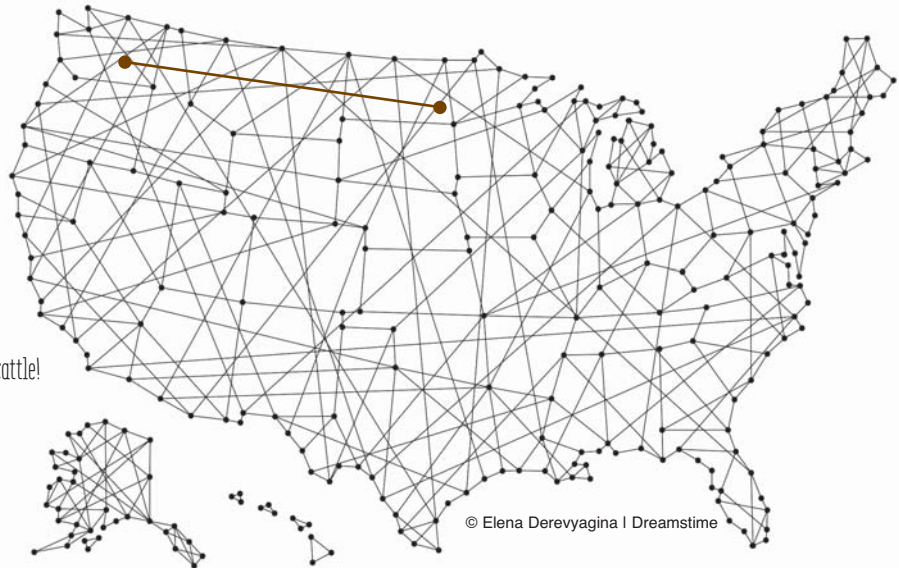
DOROTHY FLOREN

North Dakota State University

Ag Systems Management, B.S., 2017

Hometown: Royal City, Washington

Enjoys: Camping, hiking, baking, sewing ... and cattle!



© Elena Derevyagina | Dreamstime

Whenever I tell someone that I grew up in Washington State, their first question is always something along the lines of “Why the heck would you move to North Dakota?!” I can’t really explain it, but I can say that, looking back, coming to NDSU and majoring in ASM was one of the best decisions I’ve ever made.

ASM offered flexibility in courses while requiring classes like hydraulics and engines, areas where my knowledge was lacking. After growing up on a dairy replacement heifer feedlot, I wanted to take classes in crop and weed sciences and agbusiness. However, my sophomore year I took a job at the Beef Production Unit, and I discovered my passion for raising beef cattle. ASM allowed me to choose electives that paralleled with my newfound enthusiasm.

Internships have allowed me to get to know the area and make connections. I interned with Winfield Solutions as a research technician on their AnswerPlots, traveling around North Dakota and Minnesota. I also had an agronomy internship with Farmer’s Union Oil, scouting fields. Helping with the North Dakota Stockmen’s Association’s Annual Convention and co-managing the department’s Agricultural Technological Exposition—a student-run course held annually that showcases new technology and theories in the farming/ranching industries—also taught me a ton about where I want to go with my career.

College has been flying by, and while I’m not sure where I’ll end up after graduation, I know that I want to be in western North Dakota or Montana and work toward eventually owning my own ranch. I know that whatever job I end up taking, and whenever I start raising cattle, my courses and experience at NDSU and in ASM will have prepared me.





TARGET: INTERNSHIP

BRIAN SIMPER

J. R. Simplot Field Technician

College of Southern Idaho, Ag Science, A.A., 2015

Utah State University, Ag Systems Management, B.S., 2017

Hometown: Grand View, Idaho

Enjoys: Woodworking, gardening, and cooking with my wife

I am fascinated with the new technologies emerging for precision agriculture! After doing an internship for the Boise-based J. R. Simplot Company—working between the Land & Livestock and Grower Solutions divisions, I saw that agronomy will be a rapidly growing field where new technology will abound. And it didn't hurt that my soil science professor had a passion for soils—it was contagious!

In my first semester at Utah State University, a guest speaker caught my attention. He had a degree in Agriculture Systems Technology and started his career with an agronomic company. After his presentation, I approached him to ask if his company hired interns, and he gave me the information that I needed to apply. Throughout that first internship, I was very impressed with the company and my coworkers. The manager must have been equally impressed with me because he offered me a job upon graduation.

If you enjoy problem solving and agriculture, then ATM is a great option, and an internship should be your target.

In 2015, I worked as a farm intern for the Land & Livestock division of the J. R. Simplot Company in Grand View, Idaho. I spent the summer helping with fertilizer applications, calibrating pivots, and operating and maintaining tractors.

The following year, I interned for ten months with Valley Agronomics LLC in Preston, Idaho. I started in the warehouse, organizing seed and chemical pallets. I was trained and quickly promoted to the liquid fertilizer facility, where I spent most of the spring and summer mixing liquid fertilizer for custom applicators. I was also trained in the dry fertilizer facility and invested some time shadowing crop advisors.

My main career goal now is to be a top crop advisor who uses the newest and most-effective technologies to help growers maximize their yields. To reach my goal, I will need to apply the knowledge I've gained from college and internships, as well as continue learning everything I can about agronomy and precision agriculture.

I hope to absorb every aspect of the agronomy business from the ground up. I come to work every day knowing that I'm a team player. By doing my very best, I ensure that I'm making a positive difference in my company's success.

If any employer's first impression of me was that I was too scrawny to work hard, they were soon pleasantly surprised by how much energy I put out and by my positive work ethic. I find great satisfaction in problem solving and hitting the bull's eye for a job well done.





ABBI HASTINGS

Technician, Wyandot County Soil and Water Conservation District
The Ohio State University, Ag Systems Management, B.S., 2013

Hometown: Kenton, Ohio

Enjoys: Crochet, family farming, and home remodeling

I have always had a big heart for agriculture. A born-and-raised farm girl, I definitely wanted an education in the field. Agriculture Systems Management (ASM), with so many classes of interest, was the path for me.

My mother influenced me to go to The Ohio State University and pursue a career in conservation. A graduate of OSU, she is all about the Buckeyes and applies her degree as a soil conservationist with the USDA Natural Resource Conservation Service (NRCS). I grew up hearing all about conservation, and I knew the difference between dirt and soil by the time I could talk.

Deal me in for anything that is hands-on, and ASM gave me every opportunity to get my hands dirty.

Any high school students who are interested in agriculture could benefit by being active in Future Farmers of America (FFA), just as I did. My experience in FFA gave me a head start and a better understanding of what was to come in ASM. And agriculture is less and less a male-dominated field. For women checking out ASM, go for it! As my mom would say, “A woman can do anything she sets her mind to!”

I had four terrific summer internships with the NRCS. What I learned in classes was immediately applicable as a soil scientist trainee and a soil conservationist trainee. Hydrology and drainage management are both very impor-

tant in conservation. Another great experience was being part of the OSU Soil Judging Team, through which I discovered the new technology and applications that are related to agriculture.

Today, I am proud of helping farmers get conservation on the ground—saving the Earth and saving money at the same time!

My first job after graduation was at the Seneca County Soil and Water Conservation District in a position made available through a grant. Unfortunately, it was a small grant set to run out in three years, and I wanted a more permanent position.

Seeing a job posting for a district technician for Wyandot County’s Soil and Water Conservation District, I jumped on the opportunity. Today, I really enjoy getting out of the office to lay out waterways, survey ditches, and implement conservation practices. I survey the land for potential conservation practices, write up the plans, and oversee the construction.

My degree has prepared me well for my job. And my internships opened doors to the conservation field. The photo shows me with farmer friends working toward conservation ends—tree packing! I love what I do—hands on, outdoor work, helping farmers and landowners.

BUILDING ON INTERNSHIPS

WILL KACHERIS

Commercial Greenhouse and Hydroponics Specialist

University of Florida, Ag Operations Manager, B.S., 2014

University of Arizona, Controlled Environment Ag, M.S., 2016

Hometown: Orlando, Florida

Enjoys: Aquariums, hiking, water skiing, and rowing



An internship at Green Sky Growers, in Winter Garden, Florida, during my first summer out of high school was a game changer for me. I immersed myself in growing systems, management software, and the marketing of local produce, and that experience provided the first building blocks for where I wanted my college studies to take me.

Internships at several greenhouse facilities during my undergrad summers brought me to where I am today as a greenhouse designer. The greenhouses I saw during my internships featured traditional irrigation, hydroponic systems, and even full-scale aquaponics. Combined, those variations in technology and other facets of interning allowed me to consider several different sectors of the agricultural industry simultaneously.

Internships are crucial to getting positions that would otherwise be hard to land. My internships were some of my hardest work-and-learn experiences, but they fast-tracked me into making decisions on what sectors of the industry appealed most to me. There were times while working in a greenhouse or wading through research ideas when an “aha!” solution surfaced, and that made the long hours worth it.

Most people are surprised when I tell them that I like the equipment more than the biology of the greenhouse world. Customers ask me to design the perfect green-

house for their specific needs. Sometimes that means dealing with heavy snow loads or hurricane-force winds. My job requires every design to be custom, and finding that perfect solution—the perfect combination of equipment and structure—fascinates me.

GrowSpan, which is headquartered in South Windsor, Connecticut, and is a division of FarmTek, has provided me with all the necessary tools to continue learning about new products and methods within the industry. A particularly fulfilling part of my job is the on-site visits and consultations with our customers across the country.

I work mostly on greenhouse projects, but I also lead design for indoor commercial facilities nationwide. Most of my day is spent consulting with customers on various options and sizings for their grow spaces. We work across the industry with growers of many varieties—hobby, ornamental, pharmaceutical, and edible plant growers.

Without a doubt, my internships and graduate degree allowed me to move past smaller production areas into commercial-size greenhouse work. And graduating from the two leading research programs in my field is pretty wild. I enjoy opening up an agricultural news journal to see cutting-edge research from the two universities that granted me degrees!



FAIR FIND



SARAH LLOYD

Operations Supervisor, J. B. Hunt Final Mile

Texas A&M University

Ag Systems Management, B.S., 2016

Hometown: Lorena, Texas

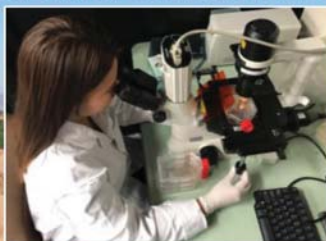
Enjoys: Golf, concerts, and Mack, my dachshund



GO BEYOND...



**INNOVATING HORIZONS FOR BIOSCIENCE, FOOD GENERATION,
BIO-DATA & ENGINEERING FOR LIFE IN ARID ENVIRONMENTS.**



THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
COLLEGE OF ENGINEERING

**Agricultural &
Biosystems Engineering**

Maneuvering the maze of career fairs, I found that recruiters are fascinated with ASM. I received multiple job offers almost a year before I graduated. I thank ASM for that.

The ASM degree is unlike any other. You study a diversity of subjects that will help you excel in many jobs. In my graduating class, I was one of only four women, but we all saw this as an advantage. The work isn't just for guys. Companies are looking for ASM-experienced women, too.

I found J.B. Hunt at a career fair at Texas A&M—it was the first company I visited and the first to offer me a job. J.B. Hunt offers training programs for the fast track to management and provides a full orientation program before your start date.

As an operations supervisor, I oversee drivers and other employees on the Whirlpool Account at J.B. Hunt Final Mile. I route, pre-plan, and help drivers complete their routes safely with trip sheets and truck management. I speak with customers to schedule product delivery and ensure that all product is loaded on trucks. Payroll, sourcing employees through temporary services, managing warehouse inventory, and customer service are daily operations for me. I also learned how to manage the warehouse in case a supervisor was out.

I love my job, and for me, it all began at a career fair!

ATM PAYS OFF



KYLER DIXON

Electric Power Generation Field Technician, Milton CAT
State University of New York at Cobleskill

Ag Equipment Technology, B.T., 2016

Hometown: Blossvale, New York

Enjoys: Tractors and farm equipment (old or new), vintage snowmobiles, mechanical and electrical repair work

People involved with production agriculture share a unique bond, and I never want to get too far away from that. Growing up in a farming community influenced my decision to pursue an agricultural technology degree. As college graduation approached, I was convinced I had made the right choice based on the numerous great job opportunities presented to me.

While in my freshman year, I looked for a summer internship to gain work experience while still in school. When I noticed a poster advertising internships at Milton CAT, I immediately applied. With only two semesters under my belt, I didn't expect to get the internship, but I was fortunate. I interned with the company during all my breaks from school, including Christmas and spring vacations. The first year I worked with technicians in the truck shop and I got involved with all facets of engine work, including numerous overhauls.

Later, I was offered several opportunities to broaden the scope of my activities and get exposure to different jobs within the company. I gained experience in the office with management, learning how to write quotes and deal with the behind-the-scenes activities of each repair. I was able to work in the parts and sales departments and develop an understanding of those operations as well.

During the summer of 2016, I worked mostly in the field with the Power Systems Division and found that I especially enjoyed that type of work. As a result, I was offered my



current job as a power systems technician upon graduation.

There's no typical day at work because there's so much variety in my tasks. The equipment the Power Systems Division works on is diverse. Power systems technicians at Milton CAT are responsible for Caterpillar engines that power a wide variety of machinery—from generators and natural gas compressors to yachts, charter boats, and heavy equipment, such as wood chippers and rock crushers.

Most astonishing to me is the staggering cost of some of the equipment we service. Coming from a farm, I was used to the high price tags associated with equipment and parts, but this is a different game. Some of the larger engines used on natural gas pumping stations cost well over one million dollars each.

My favorite part of the job is the problem-solving required to make a piece of equipment operate better than it did before, and then seeing the customer's satisfaction. I love coming to work every day, knowing that I will have the opportunity help customers work through an issue.

When you graduate with an ATM degree, you will have opportunities for some very high-paying jobs with excellent job satisfaction. To prepare yourself, get everything you can out of internship opportunities. Never turn down an opportunity to learn. The degree program is what you make of it, and a job posting may be just what adds to your take.

EMPOWERED TO INNOVATE



THOMAS HERON

Graduate Research Assistant

Penn State University, Ag Systems Management and
Environment Resource Management, B.S., 2016

University of Idaho, Soil and Land Resources, M.S., 2018

Hometown: Kunkletown, Pennsylvania

Enjoys: Music, concerts, mountain biking, and hiking/backpacking

I am Pennsylvania proud! I loved growing up in the Keystone State, knew about Penn State's rich agricultural history and its prestigious College of Agricultural Sciences, so a state school felt exactly right for me. A short time after walking into the campus buildings of my department and meeting my professors, I realized that it was up to me to embrace many different learning opportunities.

Innovation is discovery and design that delivers improvements and adjustments as well as social and economic value. Inspiring innovators are those who let go of pre-existing notions and listen to their instincts to try things differently. Einstein said, "We cannot solve our problems with the same thinking we used when we created them."

Internships are opportunities that empower innovative thinking. I had three important experiences. The summer after my junior year, I completed a research internship in a soil chemistry lab at Iowa State University—another great ag school. There I was fortunate to work with leading biochar researchers on a carbon characterization experiment.

The next summer, I completed a second research internship at the Department of Energy's Idaho National Laboratory. There I learned to model a bioenergy system.

During my senior year, I took an embedded travel course called The Co-evolution of the Land and People. On that trip, I learned about the implications of various land ownership philosophies in the context of many different civilizations throughout history. At the end of the semester, I traveled to Ireland with one of my professors to meet with environmental and agricultural professionals in the Irish government and learn about the nation's policies within these sectors.

ASM is an exciting area of study, and in college, you are surrounded by students with similar passions and new and different ideas. Embrace the power of synergy and innovate!

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GAME PLAN: PACK IT UP!

LISA ECKER

Project Engineer, GEA Process Engineering

University of Wisconsin-River Falls,

Agricultural Engineering Technology, B.S., 2017

Hometown: Wanamingo, Minnesota

Enjoys: Travel, dance, sheep ... and chickens!

I love to find efficiencies. Given a challenge, I instantly think of ways that I can improve a process. There is nothing more rewarding than an innovation or a tweak that saves time and money. In the AET program at UWRF, I found efficiencies for my course of study and customized it to graduate in three years. I carefully selected classes that would benefit me in the food process engineering field.

During the summer of 2016, I was an engineering intern at Gold'n Plump Poultry in Arcadia, Wisconsin. This excellent experience led me to a position as the plant process engineer which I was able to work while I finished my last year of college. There is no better way to learn than by having an internship. I liked my major's classes. With the internship, I applied the coursework principles. It was rewarding to use my knowledge and skills in a real, paid, industry project.

And if you want to experience a global perspective on ag, take advantage of travel/study opportunities within a program. I studied abroad in India over J-term (3 weeks in January). This AET-sponsored study trip—visiting three cities in India—focused on Indian agriculture and engineering. That's me in the picture, halfway around the world, on a banana plantation!

India is among the top global producers of many crops—including fruit, wheat, rice, cotton, peanuts, and vegetables. It has one of the world's largest and fastest growing poultry industries, too—a keen area of interest. Although Indian agriculture may not be as technologically developed as America's, it was eye-opening to see what Indian farmers accomplish with their limited resources.

Other undergrad highlights were also out-of-classroom experiences. I was involved in seven campus clubs and organizations. I learned so much from being on board with diverse organizations. One of the most beneficial was the Falcon Pulling Team for ASABE's 1/4 Scale Tractor Competition.



It's a blessing to be a female in a somewhat male-dominated field because it's easier to stand out and have my voice heard. I encourage other women to recognize the potential that we have in ag fields. The sky's the limit!

I want to make a difference in my field. Currently, my future is in the food processing industry, but I'm also drawn to alternative energy. These crucial fields appeal to me because they will both grow in the foreseeable future. I would like to work on the research and development side and improve products and processes. I hope that my future career includes travel, preferably internationally. **Travel rounds you out, gives new perspectives, and you are open to new experiences—and new efficiencies!**

I have three life pillars: integrity, efficiency, and innovation. Living by those ideals, I will be successful in any future professional endeavor. As a kid, I always dreamed of not having to work. I think it's an achievable dream. If I love what I do, I'll never have to work a day in my life!



TIM RENDALL

Project Manager, Appropriate Scale Mechanization Consortium

University of Illinois Urbana-Champaign

Agricultural Technology Management, B.S., 2013, M.S., 2015

Hometown: Bartlett, Illinois

Enjoys: Hiking, running, travel, and sports

My degree in Agricultural Technology Management allows me to work at the nexus of food, water, and energy. My passion is working toward a sustainable future, but an ATM degree can prepare you for a variety of interesting careers. You have to draw the right pieces together for that dream job, work hard, and gain experience. My advice? **Become an undergraduate research assistant, actively pursue internships, and if you can, travel!**

In 2014, while working on my master's degree, I went to Sierra Leone for a research project. The goal was to develop a low-cost jab planter for smallholder farmers. That trip was instrumental in guiding my career path. After that experience, I knew I wanted to work in international development.

I'm extremely proud of my current job as project manager for the Appropriate Scale Mechanization Consortium (ASMC) at the University of Illinois. Hunger and poverty affect a large portion of the world's population, and I'm proud to work toward eradicating those problems.

The ASMC creates and implements research and development projects to improve mechanization in Bangladesh, Burkina Faso, Cambodia, and Ethiopia. As project manager, I monitor the project progress daily and ensure that we're on schedule. This includes being an active problem solver and providing leadership in various capacities to everyone who works on the project. This has required me to learn strategies of effective leadership and how to create a positive team dynamic to meet our goals.

I was looking for a job, but this job found me! A professor of agricultural and biological engineering was awarded a large research grant just as I was finishing my master's degree and searching for employment. A member of my thesis committee knew of this new opportunity and encouraged me to apply.

Every day brings new challenges, and it's easy to stay motivated. It's especially rewarding to see the benefits of our work for smallholder farmers. One of the Grand Challenges of the future will be providing food security for the growing global population. I'm excited to be able to work toward solutions to end world hunger.

While I had some experience in international development during college, it was limited to that one summer research project. Once I started working full-time in this field, I learned about the immense number of groups and agencies that are working for the greater good. I've been able to collaborate with researchers and travel all over the world—and I've learned to think globally!





RETURN ON INVESTMENT

KATIE CARNAHAN

Purdue University

Ag Systems Management, B.S., 2019

Hometown: Paulding, Ohio

Enjoys: Fishing, whitewater rafting, and travel



I have a very serious interest in planters!

I am intrigued by the mechanics of getting seed into the ground efficiently. Today's technologies are redefining what it means to plant crops. They are amazing! I'm passionate about helping growers get their best return on investment. With the best seed placement, the potential to increase yields has never been more attainable.

While you're still an undergrad, travel, if you can, to see ag in action. Check into programs that allow you to study abroad. Even as a freshman, I was able to pack my bags and earn credits during Purdue University's spring break week. My undergrad trip focused on how sustainability is applied to agriculture in Costa Rica. Throughout the journey, my fellow students and I visited local coffee, cacao, banana, and pineapple farms. We also explored the rainforest and learned about the wide variety of plants and animals that call Costa Rica home.

This overseas experience opened my eyes to the diversity of agriculture in another part of the world compared to U.S. production. Costa Rican growers place a high priority on product quality, and they attain that superiority using few inputs that hurt the environment. In particular, they practice permaculture, a holistic approach based on traditional agricultural practices. This system uses natural forces and minimum labor without depleting the land.

Costa Rican growers and multinational corporations in the country practice two primary methods of farming: plantation agriculture (as practiced by Dole, Chiquita, Del Monte, and other companies) and sustainable permaculture. Of course, there are also indigenous communities that practice subsistence farming as well.

My Central American travel and interest in farm equipment led directly to a summer internship with Helena's northern business unit, I was

assigned to Shelbyville, Indiana. Helena's internship program is unique in that, immediately upon arriving, you are asked to "take control of the summer" and set your own personal goals. Not surprisingly, this intern's focus was precision agriculture. As I pursued that goal, I

became familiar enough with the technology to make sales calls and teach growers about it.

In the future, I want a full-time position that allows me to show growers the profound benefits of new technologies. Landing that dream job means challenging myself to understand decision making from a grower's perspective. I plan to methodically combine learning and work experience from my internships with coursework, so I can share my knowledge and enthusiasm about new planter technologies.

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NEED A CLUE?

DEPT. JOBS!

KENDRA GOBLIRSCH

South Dakota State University

Ag Systems Technology, B.S., 2018

Hometown: Redwood Falls, Minnesota

Enjoys: Fishing, hiking, biking, bodybuilding

Technology is advancing and changing every day, and it's making a huge impact on ag. When these technologies are applied correctly, we have the ability to achieve higher efficiencies and reduce inputs while increasing output. And sometimes, it all starts in a lab. Talk about making a big difference for the future!

Want to learn and earn? Check out the job possibilities in the ag department! I am employed by SDSU and work in the ag engineering shop where I assist with prepping for labs, co-designing side projects, and preparing for projects that involve woodworking or welding.

Being employed by the school and working in the ag systems department has allowed me to make connections with many staff members and students in related programs.

I work with two other students in the shop with one main goal: to increase hands-on learning in class. We are exposed to new technology every day through our preparations. I assisted with installing a few Raven field computers and auto-steer in the eight Kubota side-by-sides we use for labs. Before this job, I had no idea how the technologies worked together!

I am presented with projects where I am challenged to do research and ask the right questions in order complete the projects. Once the work is done and a project is complete, I have a sense of confidence and the ability to pass on my new skills and knowledge to others—from designing and understanding how to construct an augmented reality sandbox to making a small-scale model of a saturated buffer strip!

After learning a few geographic information systems and working with raw yield data from a combine monitor, I learned to create yield potential and prescription maps. I knew then I was in the right major! I really enjoy working with data to create NIR maps, too, and studying aerial imagery as well.



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CHANGING CAREER GEARS



JOE BLAUFUSS

YieldPoint Specialist, CHS Dakota Plains Ag

University of Minnesota Crookston

Ag Systems Management - Precision Ag, B.S., 2014

Hometown: Madelia, Minnesota

Enjoys: Camping, hiking, and being at the lake, gym, or farm

Believe it or not, I was going to be a male nurse. I grew up on a farm but took a totally different direction by pursuing a nursing degree out of high school. I soon realized I wasn't in the right niche and took a break. I knew I needed to change my plans for the future. Fortuitously, a friend from Central Farm Service—a full-service agricultural cooperative in Owatonna, Minnesota—talked to my father about precision ag and how it was revolutionizing the industry. I cued in and was completely fascinated.

I went to work for a local seed dealer installing precision planting equipment. I liked it a lot and learned a lot. A family member finally pointed out the obvious to me: "You need to go back to school and get an ASM degree. The University of Minnesota Crookston has a precision ag emphasis program—and you will thrive."

Helping people makes me tick. That was underscored when I was in nursing school, but I have greater fulfillment in my new ag career.

This was proved in two internships, the first as an Integrated Solutions Consultant intern at Valley Plains Equipment in Crookston, Minnesota. I assisted customers with John Deere GPS equipment, installed John Deere certified equipment, and activated displays and receivers. Generally, I improved customers' knowledge of John Deere products, managed JDLink accounts, and taught customers how to access and use Wireless Data Transfer and Remote Display Access.



My second internship was as a Northern Testing Answer Plot intern with WinField Solutions, also in Crookston, Minnesota. I planted and maintained steady growth of canola, wheat, and sunflowers; sprayed and sampled plants needed for testing; and took notes on how growth was doing in multiple plots.

In my present job, during spring and fall, I work with agronomists and growers to build variable-rate maps for seeding and fertilizing. I help educate agronomists on how we can use these tools to benefit a grower's operation. I also help teach growers and troubleshoot issues they may have with variable-rate maps loaded into their tractors.

In summer, I concentrate on stand counts after planting to verify that our VR mapping work is correct. We take plant tissue samples to ensure that the crop is absorbing nutrients properly, and we use satellite imagery to search for and eliminate any problem areas in the field.

Working with new technology every day is the best, and my internships underscored that and more. Technology is changing so fast that new services and equipment are ushered into the ag community all the time. I want to be on the cutting edge of the latest and greatest technology that helps growers increase crop yields—no better satisfaction than that!

GET BACK IN THE GAME



FRANK BAGGIOLINI

Assistant Farm Manager, Maricopa Orchards
California State University, Fresno, Mech Systems
Management and Precision Ag Technology, B.S., 2016
Hometown: Fresno, California
Enjoys: Team roping



I started college right after high school, studying agribusiness and animal science, but I didn't fully engage in the academic process. At the time, I was more focused on being a rodeo clown and bullfighter!

After marrying at 22, I took a semester off and got a job driving trucks. That turned into a temporary career working for a land-clearing company. Mastering all of the big equipment used in orchard removal became quite a passion for me. I became interested in the details of how the equipment worked and how it could be improved. Grinding orchard trees can be pretty abusive to machinery.

My wife persistently encouraged me to return to school and finish my long-ago-started degree—and her relentless urging finally motivated me. In preparation, I worked on my math skills through evening classes at a local junior college while still working full time.

When I was ready, I reapplied to Fresno State University. An advisor and I discussed a special major—combining classes from two departments—that was tailored to my individual interests. My decision to go back to school was timed just right.

Never underestimate the value of new or renewed experiences! During my degree program, I entered several poster competitions—that's a great way to share research projects and explain your work to others (and sometimes win a little spending money).

Considering the different possibilities that ag technology has to offer, the range of interesting projects can be endless—so putting your work on a poster is valuable for you and for others.

I like to pay attention to the details and analyze situations, to help solve problems in agriculture. At the commercial farming operation where I work, we are always looking for ways to improve our practices while retaining sustainability. Long term, I'd like to design and build some patentable machines. Five years from now, I'd like to be selling my first patent!

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GREG FRENZEL

Product Specialist, CLAAS

University of Nebraska-Lincoln

Mechanized Systems Management, B.S., 2016

Hometown: Weeping Water, Nebraska

Enjoys: Restoring vehicles, and riding off-road vehicles



I grew up on a farm working for the family trenching and trucking business. It was a natural for me to get my degree at the University of Nebraska-Lincoln, majoring in Mechanized Systems Management (MSYM) and minoring in agronomy.

Between my sophomore and junior years, I had an internship with Syngenta Crop Protection. I performed chemical research and development at several locations with various crop types. Later, I took the opportunity to visit Argentina on a study-abroad program. I experienced agriculture in a nation with terrain that encompasses the Andes Mountains, glacial lakes, and the Pampas, the grazing land of Argentina's famed beef cattle. While enjoying the culture, I learned about the local infrastructure and how Argentina's farming operations differ from those of U.S. growers.

Hands down (and hands on), the highlight of my school experience was my job at the Nebraska Tractor Test

Laboratory. I spent hour upon hour at the lab performing tests on manufacturers' tractors and working on the University of Nebraska's 1/4 scale tractor. Our team took first place at the 2016 ASABE International 1/4 Scale Tractor Competition—that was a thrill!

Through the ASABE Nebraska Section, I made a connection with the human resources department at CLAAS. **My experience on the 1/4 scale tractor team and job at the Nebraska Tractor Test Laboratory was a plus for me as a job candidate. My resume also showed experience in team research, design, marketing, test and validation, and fabrication.** Throughout the interview process, I tried to convey that I wasn't just looking for a job. I wanted the challenge of improving equipment performance through innovative technology. *Bingo!* I knew that I wanted to work for this company, and I plan to continue with the equipment industry as the future unfolds.

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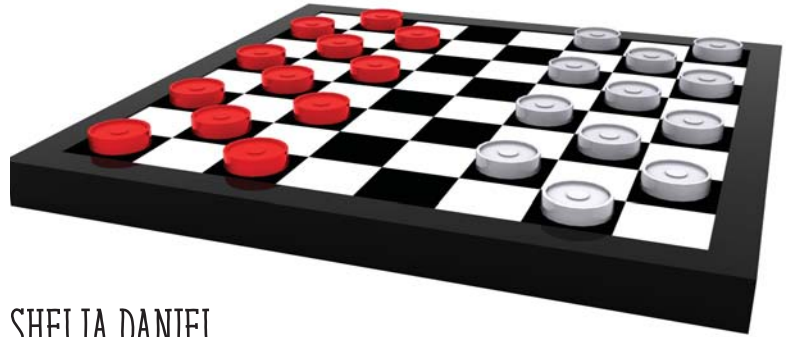
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MAKE YOUR MOVE



SHELIA DANIEL

Field Service Representative, New Holland Agriculture

University of Tennessee at Martin, Ag Engineering Technology, B.S., 2015

Hometown: Cypress Inn, Tennessee

Enjoys: Hunting, fishing, photography, farming, cooking, gardening

If you love agriculture, then AET is the degree is for you. The possibilities are endless, and an AET degree will give you knowledge you will use in your ag career. I did a field service internship with New Holland Agriculture during the summer before my senior year. I was based in North Carolina, but I traveled to 15 states in three months. The focus of the internship was to learn how to provide dealerships with assistance with anything service-related. I was able to troubleshoot equipment, diagnose issues, answer warranty questions, visit customers, and attend farm shows. The experience was awesome. I gained hands-on experience and an outlook on what a career in my field was really like.

The highlight of the school experience? The ASABE 1/4 Scale Tractor design team! When I arrived at college. I didn't really know anyone. I saw a display for the team at a freshman fair and signed up. As the first female on the team, I think the guys wondered how long I would last. But they took me under their wings and taught me about The International 1/4 Scale Tractor Student Design Competition. Teams of students are given a 31 hp Briggs & Stratton engine and a



set of Titan tires. Design is up to them. A panel of industry experts judge the machines, which are put to the test in three events—tractor pulls, a maneuverability course, and a durability course.

The Competition opened the door for my internship with New Holland. After completing the internship, I was offered a trainee position. I knew it was the right fit for me because I love to help people. Once the training was completed, I was responsible for my own five-state territory.

This is, for sure, my dream job. I see myself continuing my career with New Holland Agriculture. I like to work with the dealers to make them the best-servicing dealers in the country. I wake up every day

knowing that I get to help farmers and work with equipment I love. And now the company is sponsoring me to continue my education! I'll be pursuing an M.S. in agriculture, concentrating on agronomy, at Auburn University.

Editor's note: For more information on the ASABE International 1/4 Scale Tractor Competition, visit: www.asabe.org/quarterscale

A CAPITOL MOVE



ARTURO BARAJAS

Legislative Aide, California State Assembly

California Polytechnic State University, San Luis Obispo, California

Ag Systems Management, B.S., 2015

Hometown: Modesto, California

Enjoys: the great outdoors

My high school ag teacher was the first person to really show me the importance of agriculture. Agriculture is more than just farming; there are huge fields of technology and innovation, which support the people who grow the food we eat.

After graduation, I went straight to Cal Poly, where I majored in ASM because of the incredible hands-on experiences offered in the BRAE department and the flexibility of career paths for future grads. I saw the Cal Poly Tractor Pull and decided then and there that I wanted to be involved in that!

Being on the Cal Poly Tractor Pull Team was the highlight of my college experience. It's not everyday that you get to drive a 1200 HP modified tractor in front of 3,000 spectators on campus, all while raising money for the Cal Poly Tractor Pull Scholarship Fund.

I got neck-deep in student clubs and internships while in college. I served as President of the Cal Poly Tractor Pull Club and President of the Ag Engineering Society. I interned at a dairy, a cheese company, and a vineyard management company. I also served as the irrigator for the Cal Poly crops unit for two years, thanks to my knowledge of different irrigation systems.

However, the last quarter of college I took a turning-point class—AG 452 Issues Affecting California Ag. I realized that there was a place for people with technical knowledge of ag and water to work on policy issues. Policies affect everything, and I could use my degree to help analyze policy! Not knowing what to expect, I

interned with the Governor's Office, then got hired as a legislative aide to focus on water and agriculture issues.

I now work in Sacramento for an Assembly member serving on a legislative staff in policy work. (I thought I would be the only person who hadn't studied political science, but that isn't the case!) In addition to using my technical knowledge, I use project management skills moving through the legislative process. I am the lead on a number of bills and am responsible to our Assembly member, giving him all the information he needs for committee meetings, press conferences, or floor sessions.

ASM graduates go on to serve in many different roles. So my advice? Make finding a fulfilling job a full time job. Take every interview opportunity, and remember that interviews go both ways: you are interviewing them just as much as they are interviewing you!



WOMEN IN AG

STACIE ANN SILVA

California Polytechnic State University, San Luis Obispo, California

Ag Systems Management, B.S., 2018

Hometown: Tulare, California

Enjoys: Archery, hiking/backpacking. Avid reader and inspired by TED Talks.



Being involved in the Cal Poly Ag Engineering Society (which has our ASABE branch under its umbrella) has been the highlight of my college experience. My service as both AES president and Student Mechanized Branch vice president (and one of the BBQ co-chairs!) helped me grow and realize my potential. It enriched every day on campus with new relationships and experiences.

I'm proudest of being the first female BBQ chair in the over-30-year history of our club. I was elected because people saw me as capable and organized. I felt understood, trusted, and like I was in on the secret! I was serving in a role with a majority male membership, and no one batted an eye.

I have one more year at Cal Poly. After graduation, I plan to move to Sacramento and pursue a law degree with a focus on ag issues and policy. My goal is to work in the state capitol during law school and learn the right moves, so that after law school, everything will fall into place and I'll be equipped to find a job influencing policy. In the future, I hope to be a successful lawyer, lobbyist, and "agvocate."

My long-term goal is to attend law school, but I know that I'll be more valuable if I get a technical degree first. My father is a highly technical person with the mind of an engineer, but he was not able to attend college because he was needed to help run the family dairy operation. That always bothered me when I was growing up. I want to take what I learned growing up in my dad's machine shop and show him that, even though he wasn't able to pursue a

degree, his influence has helped me reach the next level.

I wanted a program that would challenge me, and I found that in Ag Systems Management. I knew I had made the right decision when I showed up for classes in my major. I was stoked to learn about cost analysis and hydraulics, and that euphoria still happens every time I walk into a classroom.

Don't just think about an ASM degree, do it! ASM will force you to use your brain in ways you never have before, and that is oh-so-powerful. But don't let your classes get in the way of your education. If you're a woman, that may not be easy. You might be the only female in some of your classes, and you may have to deal with some doubt (from yourself and your classmates). There might even be an unsavory comment or two thrown your way, but you will be all the stronger for it. The only way to inspire change in industry or society is to assert your position in it. Women now occupy more classroom space in traditional engineering programs and management programs—especially technical management programs—but we still have a ways to go. Don't let that deter you from pursuing the education you want. **Don't be afraid to be a presence in the classroom. You go, girl!**

Read more of Arturo Barajas's story and my story on the next page.

ONE CLASS CHANGED... EVERYTHING



Course AG 452: Issues Affecting California Agriculture is offered during the winter quarter at Cal Poly. Over a decade ago, it was the brainchild of successful lawyer and lobbyist George Soares, a partner with Kahn, Soares, & Conway, and the College of Agriculture, Food, and Environmental Sciences (CAFES). AG 452 is currently led by Dr. Mark Shelton. The class meets for 16 sessions with ag industry heavy-hitters as presenters—commodity board presidents, major policy shapers, and the like.

For over ten years, the CAFES Dean's Office has reviewed recommendations from department heads and selects the top twenty students to participate. The result: a class full of ag student rock stars!

The Department of BioResource and Agricultural Engineering (BRAE) has had students accepted into AG 452 since the beginning. Most of them learn what they can and then move on to pre-planned careers in traditional BRAE and ASM fields. However, this was not the case for Arturo Barajas, B.S. ASM 2015, who now works at the California state capitol as a legislative aide to a state assembly member, and Stacie Ann Silva, a fourth-year ASM student who's contemplating law school and a move to Sacramento. As a result of her experience in AG 452, Stacie plans to work in the capitol, like Arturo, upon graduation.

The course culminates with a two-day trip to Sacramento for visits, presentations, and conversations with lobbyists, industry leaders, and lawyers, as well as a presentation of the group's term project to the California Farm Bureau. This experience is where everything connected for Arturo and Stacie. When Arturo was in the class, he was also the Tractor Pull President and was focused on a career in the wine industry. Similarly, Stacie was the Ag Engineering Society President and was focused on a career in machinery and fabrication safety. Both were active participants during class discussions, and they were drawn toward policy and its ramifications, but the possibility of a career change did not occur to them until the trip to Sacramento.

For Stacie, the change happened quickly. The prep for the term project was exciting, and her research into regulatory constraints on California agriculture was thought-provoking and all-consuming. At the state capitol, she was thrilled with

the caliber of conversations she and the other class members engaged in. One particular presenter struck a nerve when he said that "ignorance is no longer acceptable, and there isn't enough money or time to address this regulatory fight forever. We need to start thinking differently!" Going to law school after earning a technical degree is unusual, but the presenter's words ignited a passion in Stacie, and she discovered her aptitude for the political.

For Arturo, the Sacramento trip was also an eye-opening experience. He saw that there was a need for people who understand the technical issues in agriculture and water resources to also understand the legislative process. Having hands-on experience in researching current policies, compiling reports, and presenting his work at the capitol solidified his interest in work with the legislature. In addition, he realized that not everybody who worked in the capitol was a political scientist, and a diverse group of people is needed to develop effective policies.

While the focus of an ASM degree is generally technical, the techniques for learning and processing information that it teaches make ASM graduates well suited for many fields, including law and public policy. During their undergrad years, Stacie and Arturo had no idea that their degrees were preparing them for game-changing careers in policy issues. One class might do the same for you!



Stacie Silva (fourth from left) at the California state capitol.

GOING SOLO, PASS GO



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MITCHELL HORA

Iowa State University



Ag Systems Technology and Agronomy, B.S., 2017

Hometown: Ainsworth, Iowa

Enjoys: Learning more about soil health, sustainability, and water quality—and attending Iowa State football games.

It was during my freshman internship with E4 Crop Intelligence in Woodbine, Iowa, that I decided to pursue a career in consulting. I began developing business plans and tailoring my curriculum, and I added an agronomy major to the Ag Systems Technology program.

As a sophomore, I interned with Anez Consulting in Willmar, Minnesota, and continued the pursuit to start my own company aimed at improving soil health. I started working independently with a company in South Africa—my first customer—and this led to the incorporation of Continuum Ag.

Through the ISU Ag Entrepreneurial Initiative, I spent my final Thanksgiving break visiting my client in South Africa. I visited farms that I was working with remotely and saw a variety of crops: corn, plums, grapes, wheat, onions, carrots, potatoes, and peanuts. I gave two presentations on the status of soil health in the U.S., and today, Continuum Ag continues working towards improvement of agriculture around the globe.

At Iowa State, I had incredible opportunities with various organizations, where I developed my skills as a leader. It was my involvement in collegiate organizations, networking opportunities, and the Initiative that prepared me for the business world.

Today, Continuum Ag, works with farmers, consultants, and agribusinesses to evaluate soil biology and nutrient availability, as affected by modern agricultural management practices. I'm currently working with about 30 Iowa farmers, as well as companies in South Africa, Colorado, Minnesota, Wisconsin, New Zealand, and beyond. Working with agribusinesses, Continuum Ag connects new products to Midwestern farmers in order to evaluate the effects on our soils. A movement for improved soil health has really taken off, and Continuum Ag plans to stay on the cutting edge.

With a start-up company, there is always a long "to do" list, but my work ethic drives me to get things done. My

plan is to change the world of agriculture by logistically implementing soil health practices. Modernized sustainable farming must provide for a growing population, while at the same time remaining profitable for the grower.

My advice for those considering starting a business? Take the risk and go for it! Opportunities abound with an ATM degree.

IOWA STATE UNIVERSITY

Department of Agricultural and Biosystems Engineering

Undergraduate Majors: Agricultural Engineering, Biological Systems Engineering, Agricultural Systems Technology, & Industrial Technology

Graduate Majors: Agricultural and Biosystems Engineering & Industrial and Agricultural Technology

For more information:

www.abe.iastate.edu

(515) 294-1434 | abe@iastate.edu | Ames, IA



ATTITUDE IS EVERYTHING

JOE WRIGHT

North Carolina State University

Ag and Environmental Technology/Ag Business Management, B.S., 2008

Hometown: Casar, North Carolina

Enjoys: The outdoors, boating, fishing, big equipment, volunteer firefighting, piloting small planes; centered on faith, family, church ... and GO PACK!



I am the founder and owner of Wright Contracting, LLC. I started the company in 2008, and we currently have two divisions: Environmental Restoration and Heavy Construction. I employ about 30 people, and we work all over the country with multiple crews in many states on a variety of projects. Our volume is between \$6 million and \$10 million per year. We currently have several large stream restoration projects averaging around 10,000 linear feet, as well as several site work and Department of Transportation projects.

I had dreams of being a fighter pilot in the U.S. Air Force, and I arrived at North Carolina State University with that intention. Basket weaving was fine with me as a degree, as long as I could be a pilot! But family and friends kept saying I should go into some type of earthwork or construction. Colonel Charlie Hicks, a retired USAF fighter pilot, instructor, adviser, and now close friend, always encouraged me to follow my dreams but keep my options open.

I had never quit anything before dropping out of Reserve Officers' Training Corps, but doors opened up for me. I worked with an advisor in the College of Ag and Life Sciences. I described

the things I liked to do, and she suggested the Agricultural and Environmental Technology program. I did a little research, and I was on board. The degree program offered a lot of options. I could pull in classes from different colleges within NCSU, and I was able to create a hands-on track that gave me the knowledge and the contacts to be successful today.

The AET program prepares you to be the middleman between engineers and end users. If you're technical and smart enough to be an engineer, and have enough common sense to explain a process to the person who is going to use it, sell it, and make people believe in it, then AET is the degree for you.

During my summers and downtime between classes, I was able to work with the Waste Group and Water Quality Group, which are cooperative extension arms of NCSU. I learned about the importance of research and implementation in the environmental industry. I was able to meet a lot of different people and make industry contacts.

As an employer, the top three attributes that I look for in a new hire are attitude, attitude, and attitude. Someone with a good attitude will always try, work hard, and learn to the best of their abilities. It doesn't always mean a perfect fit for a particular job, but ultimately with a positive attitude the hire will succeed. I think bosses and employers get a bad rap sometimes! I genuinely want to help others to be as successful as I have become. It's the best part about my career.

I would like to see more people pursue entrepreneurship and lead roles. As an industry and as a country, we need job creators more than ever.



SEARCHING FOR A SCHOOL?

These schools have programs in agricultural systems and technology. Contact them directly for more information. Many of these programs are administered by Agricultural and Biological Engineering Departments.

ARKANSAS

University of Arkansas
B.S.: Agricultural Systems Technology Management*
agricultural-education-communications-and-technology.uark.edu/undergraduate-studies/agricultural-systems-technology-management.php

CALIFORNIA

California Polytechnic University, San Luis Obispo
B.S.: Agricultural Systems Management*
brae.calpoly.edu

California State University, Chico
B.S.: Agriculture
www.csuchico.edu/ag/degrees-and-options/index.shtml

Fresno State University
B.S.: Industrial Technology - Agricultural Systems Management Option
www.fresnostate.edu/catalog/subjects/industrial-technology/it-agsm.html

FLORIDA

University of Florida
B.S.: Agricultural Operations Management*
www.abe.ufl.edu/academics/undergraduate/ag-op-management-major.shtml

GEORGIA

Abraham Baldwin Agricultural College
B.S.: Agriculture, Agricultural Technology and Systems Management
www.abac.edu/academics/schools/ag-natural-resources/agriculture

Fort Valley State University
B.S.: Agricultural Engineering Technology
ag.fvsu.edu/index.php/departments/engineering-technology/ag-engineering

IDAHO

University of Idaho
B.S.: Agricultural Systems Management
www.uidaho.edu/cals/soil-and-water-systems.aspx

ILLINOIS

Southern Illinois University
B.S.: Agricultural Systems
M.S.: Plant, Soil and Agricultural Systems
coas.siu.edu/academics/bachelors/ag-systems
coas.siu.edu/academics/masters-degree/plant-soil-systems

University of Illinois
M.S. and M.S.: Technical Systems Management*
abe.illinois.edu/undergraduate/technical-systems-management

INDIANA

Purdue University
B.S., M.S., and Ph.D.: Agricultural Systems Management*
engineering.purdue.edu/ABE/academics/undergraduate/asm.html

IOWA

Iowa State University
B.S.: Agricultural Systems Technology
B.S.: Industrial Technology
M.S.: Industrial and Agricultural Technology
Ph.D.: Industrial and Agricultural Technology
www.abe.iastate.edu

KANSAS

Kansas State University
B.S.: Agricultural Technology Management*
www.bae.ksu.edu/undergraduate/atm

MINNESOTA

University of Minnesota, Crookston
B.S.: Agricultural Systems Management
www.crk.umn.edu/academics/agriculture-and-natural-resources-department/agricultural-systems-management

MISSISSIPPI

Mississippi State University
B.S.: Agricultural Engineering Technology and Business
M.S.: Engineering Technology
www.abe.msstate.edu/academics/undergraduate/agricultural-engineering-technology-business

www.abe.msstate.edu/academics/graduate/engineering-technology

MISSOURI

University of Missouri
B.S.: Agricultural Systems Management*
asm.missouri.edu

NEBRASKA

University of Nebraska
B.S. and M.S.: Mechanized Systems Management
msym.unl.edu

NEW YORK

State University of New York, Cobleskill
B.T.: Agricultural Equipment Technology
www.cobleskill.edu/academics/schools/agriculture-and-natural-resources/agricultural-engineering/agricultural-equipment-technology-bt.asp

NORTH CAROLINA

North Carolina State University
B.S.: Agriculture and Environmental Technology
www.bae.ncsu.edu/academics/undergraduate-programs/#aet-technology

NORTH DAKOTA

North Dakota State University
B.S.: Agricultural Systems Management
www.ndsu.edu/aben

OHIO

Ohio State University
B.S.: Agricultural Systems Management*
fabe.osu.edu/future-students/agricultural-systems-management

PENNSYLVANIA

Penn State University
B.S.: BioRenewable Systems
abe.psu.edu/majors/biorenewable

SOUTH CAROLINA

Clemson University
B.S.: Agricultural Mechanization and Business
www.clemson.edu/cafls/departments/agricultural-sciences/index.html

SOUTH DAKOTA

South Dakota State University
B.S.: Agricultural Systems Technology*
catalog.sdstate.edu/preview_program.php?catoid=30&pooid=6698&returnto=3837

TENNESSEE

University of Tennessee
B.S.: Agricultural Systems Technology
ag.tennessee.edu/BESS/Pages/agriculturalsystems.aspx

University of Tennessee, Martin
B.S.: Agriculture, Agricultural Engineering Technology Option
www.utm.edu/departments/agnr/agundergrad.php

Tennessee Technological University

B.S.: Agricultural Engineering Technology
www.tntech.edu/aghs/academic-programs/school-of-ag/areas-of-study/agengineering

TEXAS

Texas A&M University
B.S.: Agricultural Systems Management*
baen.tamu.edu/academics/undergraduates/degree-programs

UTAH

Utah State University
B.S. and M.S.: Agricultural Systems Technology*
aste.usu.edu

WISCONSIN

University of Wisconsin, River Falls
B.S.: Agricultural Engineering Technology*
www.uwrf.edu/AGEN/index.cfm

* Curriculum recognized by ASABE's Agricultural Technology & Management Curriculum Review & Program Recognition Committee

CAREER OPPORTUNITIES

Degree in hand, what can you do?
Where can you apply?

Ag Systems graduates are in high demand. Depending on qualifications and experience, starting salaries for ASM graduates range from \$30,000 to \$65,000 and average approximately \$53,000 per year, according to The Ohio State University. Starting salaries depend on a candidate's skills, previous work experience, and other factors determined by various employers. For more information, check with individual schools regarding their placement records (see page 27.) **So, what would you like to do? What company could you work for? Here are some ATM-degreed ideas!**

Grain Elevator Manager
Farm Equipment Dealer
Plant Production
Supervisor
Irrigation Salesperson
Soil Conservationist
Precision Agricultural
Specialist
Reclamation Inspector
International Ag
Development
Ag Structures Manager
Vo-Ag Teacher
(with certification)
Irrigation Management
Territory Service Manager
Crop Specialist
Farm Appraiser
Energy Advisor
Petroleum Sales
Water Quality Specialist
Control Systems Manager
Farm Facilities Manager
Safety Specialist
Product Testing
Marketing Supervisor
Veterinary Technician
Loan Appraiser
Farm Manager/Operator
Engineering Technician
Food Processing Plant
Manager
Parts Operations Supervisor
Service Representative
Ventilation System Designer
Waste Management
Technician
Golf Course Manager
Environmental Consultant



Application Specialist
Training Manager
Research Technician
Integration Manager
Construction Supervisor
Facilities Manager
CAD Programmer
County Extension Director
Agricultural Imports
Inspector
Grove Management
Quality Control Manager
Cooperative Extension
Specialist
Design Technician
Bank Field Representative
Experimental Mechanic
Dairy Equipment
Specialist
Network Engineer
Operations Manager
Program Technician
Structures Specialist
Professor
Site Superintendent
Soil Scientist
Water Management
Specialist



"Short List" of Prospective Employers

Aerotech
Ag Reliant
Allen Bradley
AGCO
Ag-Chem Equipment Co.
Archer Daniels Midland
Banner Engineering
Blue Bell Creameries, Inc.
Bobcat
Bunge
Cargill
Case-New Holland
Caterpillar
Cenex-Land-O-Lakes
CLAAS
ConAgra
Consolidated Grain and
Barge
Cummins Engine
Dairyland Seeds
Deere & Company
DeKalb-Pfizer Genetics

Detroit Diesel
Dole Fresh Vegetables
Dow AgroSciences
DuPont/Pioneer
Eaton Corp.
Eli Lilly
EPA
FMS
Farm Credit Service
FieldStar
Frito-Lay
Gavilon
Gehl
General Electric
General Mills, Inc.
Gilardi's Frozen Foods
Government agencies
Growmark, Inc.
Helena Chemical
Hershey Foods
Hog Slat, Inc.
Holt Agribusiness
Hormel Foods Corp.
IBM



Ingersoll Rand
John Deere
Kinze Mfg. Co.
Koehler
Kraft Foods
Kubota Tractor Corp.
Landoll Corp.
Monsanto
Morton Buildings
Mustang Tractor
National Instruments
NGL Energy Partners
Omron Industrial
Automation
Parker Hannifin
Peace Corps





Pella Corp.
 PepsiCo
 Pillsbury
 Pinnacle Food Group
 Pioneer Hi-Bred
 Polaris
 Purina
 Quaker Oats
 R and G Ag Services
 Rain Bird
 Raven Industries
 Rockwell Automation
 SICK

Simplot
 Spreckles Sugar Co., Inc.
 Soil Conservation Service
 Spraying Systems, Inc.
 Sukup Mfg. Co.
 Techmark
 The Dial Corp.
 Toro
 Tyson Foods, Inc.
 USDA
 Valmont Industries
 Vermeer
 Wright Contracting LLC



PROFESSIONAL LISTINGS



Agricultural Engineering Associates
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 Muncie, IN 47304

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BIOSYSTEMS ENGINEERING, B.S.

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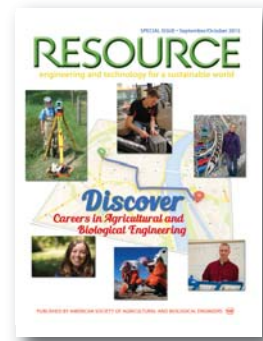
- Ecological Engineering
- Sustainable Bioprocess Engineering

445 Brackett Hall
Clemson University
Clemson, SC 29631
864.656.3276

www.clemson.edu/majors/biosystems-engineering

Want to learn more about options and opportunities in ag studies?

Stay tuned! Coming in September 2018: DISCOVER Careers in Agricultural and Biological Engineering.



DISCOVER will

- Showcase the agriculture and bioengineering field,
- Provide insights on choosing a major, working through the coursework, and
- Feature the varied jobs awaiting graduates.

Check out **Libby Zanin's** experience on the following page. Biosystems Engineering, an interesting option within the engineering field, opens doors to many opportunities that students with a traditional ag engineering degree may not have considered.

New opportunities, like hers, will be front-and-center. Wait and see ... and discover!



What's your passion? Searching for a path? ASABE can help you make it happen!

ASABE is a not-for-profit professional and technical organization whose members are involved or interested in engineering and technology for agriculture, food, and biological systems.

With members in more than 100 countries, ASABE offers every member a world of opportunities. And it's a great place to be a student.

ASABE student members are making a difference—blazing new trails, sharing ideas, gaining confidence, and developing professional careers.

The benefits are incredible ... and it doesn't cost a lot!

Want to know more? Log on to www.asabe.org and find out more about the Society and student membership.

Agricultural Systems Management University of Missouri

<http://asm.missouri.edu>
1.800.995.8503

Leon Schumacher
schumacherl@missouri.edu



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THE NAME OF THE GAME: PROBLEM SOLVING

ELIZABETH ZANIN

6th and 7th grade math teacher, Collegiate Hall

2017 Teach for America Core Member, Greater Tulsa

Clemson University, Calhoun Honors College

Biosystems Engineering, B.S., 2017

Hometown: Charleston, South Carolina

Enjoys: Hiking, biking, soccer



My passion for the environment, combined with my love of math and innovation, led me to a biosystems engineering major at Clemson University. It was the perfect combination; it challenged my strengths and pulled in my passions. I want to make a difference in stopping global climate change, and this was the perfect major to move me in that direction.

In my Introduction to Biosystems Engineering class, we designed and created our own microbial fuel cells. I was super excited to be in a major that allowed hands-on projects and interactions with current research.

Traveling abroad, I studied renewable energy in Trier, Germany, and learned about different types of sustainable energy in a country that is leading the movement. I was encouraged to see people joining together to work toward a green future for their country.

My internship experience at Clemson revolved around doing research in the lab of Dr. Terry Walker, upon which I wrote my honors thesis focused on biodiesel production using enzymes and methyl acetate. This combination does not form soap in the reaction but creates a different product: triacetin. The functionality of this compound in fuel is unknown. The goal of my project was optimization of this production process, and I presented my findings at the National Biodiesel Conference in San Diego and the Newman Seminar Series for Biosystems Engineering at Clemson.



**Coming in
September 2018:
Resource magazine's
DISCOVER!**

**Career options and
profiles in Ag and
Bio Engineering.
Don't miss it!**

I also worked as a peer tutor in college, and that experience led me to realize what great educational inequities we have in our country. My classmates at Clemson had widely varied experiences leading up to their acceptance to the university.

I wanted to be a part of improving education, making sure that all people get the background they need to be successful in college, if they choose to attend.

To do my part, I am proud to be a part of Teach for America, an organization that works to establish educational equity for children across the United States. I made a two-year commitment to teach children in Tulsa, Oklahoma. After that, I hope to go on to graduate school for a PhD, aspiring to work in a National Laboratory to help create a greener and more sustainable future for our country.

It might surprise you to learn that I am dyslexic. Many may see this as a hindrance to academic success, but learning disabilities can actually improve a person's ability to work around learning obstacles and to see problems from different perspectives. My undergraduate work prepared me to work hard, and I have learned to keep my head up in the face of difficulties. I think that these are two skills that I can take with me anywhere I go. **Earning a degree in engineering strengthens your ability to solve problems, which is essential in any position and in everyday life.**



BIOLOGICAL & AGRICULTURAL ENGINEERING

TEXAS A&M UNIVERSITY



AGRICULTURAL SYSTEMS MANAGEMENT

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