CENTER FOR AGRICULTURAL DATA SCIENCE

The Department of Crop Sciences in the College of Agricultural, Consumer and Environmental Sciences (ACES) at the University of Illinois has a rich history of making transformational discoveries in the agricultural and food arenas that continue to improve the world's ability to produce a safe, abundant food supply. We also train hundreds of top-tier scientists, who enter the workforce to continue to expand the scientific knowledge base and create cutting-edge technologies that improve the efficacy of food production while promoting environmental sustainability. As methodologies and technologies change, so do industry workforce needs. Our intention is to create a training center for talent development in agricultural data sciences to meet the workforce needs in data analytics of the rapidly evolving food, agriculture, and allied industries.

OPPORTUNITY:

The Center for Agricultural Data Science (CADS) will be interdisciplinary in nature, including the involvement of faculty from other colleges, schools, and institutes at Illinois as determined by the expertise needs in data analytics. The center will be modeled after the highly successful Illinois Plant Breeding Center, which partnered with industry several years ago to address the inadequate number of graduates with expertise in plant breeding needed to fill industry demands.

According to projections from the U.S. Department of Agriculture, there will be 60,000 job openings annually in the agriculture industry through 2020; with only 35,000 students graduating each year to fill these positions. Of these available job opportunities in the next five years, it is estimated that 27% will be in the technology, science, engineering, and mathematics areas of agriculture. Also, the U.S. Department of Commerce estimates that STEM jobs will grow 1.7 times faster than non-STEM occupations during the same period of time. Some of the job opportunities increased in availability in recent years include: precision agriculture, agriculture IT, bioinformatics, computational biology, and web programming for agriculture companies. These career opportunities are certain to continue growing as the agriculture companies continue to advance and bring more technology into their practices. In response, the College of ACES proposes to develop programs to educate the next generation of professionals in agriculture to satisfy this demand. Specifically, the Department of Crop Sciences in partnership with the Department of Computer Science have created a new major in "Computer Science + Crop Sciences."

The generation of huge data sets in several areas of agriculture, such as genomic selection and prediction through molecular genetics, high through-put phenotyping systems, data from unmanned aerial vehicles (drones), collection of extensive weather and climate data, and multiple layers of GIS-based data, are creating a growing requirement for people with backgrounds and skills combining agriculture and computer science. These individuals are essential for management, analysis, and interpretation and analysis of the data generated.

The programs under CADS will be based on immersion learning opportunities for undergraduate and graduate students, which allow them to practice integrating interdisciplinary components with people from diverse disciplines and ethnic-backgrounds to address real-world research problems as part of their academic training. Projects will be defined through university-industry collaborations or will be designed to address needs identified by industry partners. The goal

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is to allow people to activate their innovative spirits by developing an appreciation for diverse perspectives and through team problem solving experiences. Team members will be selected based on the diverse array of disciplines needed to address the problem. Science communication literacy will be integrated into the training program.

RESOURCES REQUIRED:

To allow and encourage students to combine non-traditional subjects in their studies and research, a core faculty for CADS partnered with industry collaborators is essential. Faculty responsibilities will be focused on interdisciplinary education, mentorship, and recruitment. Mentors will ensure that students at all levels are combining quantitative, engineering, and mathematics focused disciplines with crop sciences, agriculture, and biotechnology.

In addition, compelling fellowships and scholarships will be offered for outstanding students at the B.S., M.S. and Ph.D. levels. Our offerings will begin with scholarships to support students enrolled in the CS + CPSC joint B.S. degree, which will combine our rigorous crop sciences program in biotechnology, agronomy and breeding with a top-flight computer science and data science education, sufficient to qualify students for any high technology career. We will offer fellowships for the M.S. in crop sciences and the M.S. in bioinformatics, a degree that was established and is taught partly within the crop sciences department. All of our fellowship programs will combine our latest degrees and courses with immersive industry internships with key technology-focused agricultural partners, along with training in management, team-building programs such as residential classes, and extensive training in communication.

The center will need:

- endowment of two faculty positions
- fellowship support for graduate students in agricultural data science
- support for recruiting top-caliber students into the agricultural data science; the support will partially cover costs of recruitment, including visits to campus for prospective undergraduate and graduate students and will be allocated over 3.5 years
- support for professional development beyond technical fundamentals; professional development includes short courses related to leadership, professional behavior (e.g. social expectations, ethics), and business management; and unique external courses and workshops that provide extra educational value. Professional development opportunities will be available to all fellows
- support for undergraduate internships

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