

iSEE Quarterly (iQ)

AN UPDATE FROM THE INSTITUTE FOR SUSTAINABILITY, ENERGY, AND ENVIRONMENT (iSEE)

Spring 2022

What's new in education ...

iSEE Names 8 Levenick Teaching Fellows

The Institute for Sustainability, Energy, and Environment (iSEE) has selected eight faculty instructors to be part of [the 2022-23 Levenick iSEE Teaching Sustainability Fellows cohort](#).

Funded by a [generous endowment](#) from Illinois Alumnus Stuart L. Levenick and his wife Nancy J. Levenick, this fourth cohort hails from across the University of Illinois Urbana-Champaign campus — and beyond. One of our fellows represents a collaboration with the Zhejiang University International Campus; another will offer a class jointly with the University of Manchester, UK.

All eight Teaching Fellows will incorporate sustainable thinking into existing classes or create entirely new courses built around eco-friendly elements.

"We are excited about the breadth of courses that will emerge from this year's program," iSEE Associate Director for Education & Outreach Luis Rodríguez said. "From sustainable concrete in architecture to emerging environmental issues to a look at sustainability trends in Urbana-Champaign, these courses will provide a wealth of knowledge to the students who take them."

"We are grateful to the Levenicks for the generous donation that sustains this [program](#). As part of our educational



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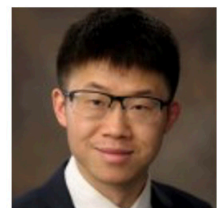
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commitment to the Illinois Climate Action Plan, iSEE is striving to incorporate sustainability into as many classes as possible. And with a majority of the Levenick fellows working on 100- and 200-level courses, we are doing our part to reach as many students as possible."

The 2022-23 awardees:

- Kate Abney, Associate Director of Intercultural and Global Learning in the College of Liberal Arts & Sciences;
- Benjamin A. Bross, Assistant Professor of Architecture;

- Niloufar Emami, Assistant Professor of Architecture;
- Ryan Flanagan, Senior Lecturer of Rhetoric at ZJU-UIUC Institute in Haining, China;
- Surangi Punyasena, Associate Professor of Plant Biology;
- Mark Taylor, Associate Professor of Architecture;
- Gretchen Winter, Clinical Assistant Professor in Business Administration; and
- Jinhui Yan, Assistant Professor of Civil & Environmental Engineering.

What's inside ...

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Everything You Need to Know about 'Agrivoltaics'

What are agrivoltaics, and why are they important? What benefits could they hold for food and energy production, crop yields, or water use?

This spring, iSEE and Interim Director Madhu Khanna have helped answer these questions and more about SCAPES — Sustainably Colocating Agricultural and Photovoltaic Electricity Systems — a \$10 million, four-year project funded through the USDA's National Institute of Food and Agriculture (NIFA). The new [SCAPES website](#) debuted in March.

Later that month, with help from



project researcher Paul Mwebaze, iSEE Communications Intern Quinn Wolski released a [SCAPES FAQ](#), which explains the idea behind agrivoltaic systems — growing

crops alongside solar panels — as well as the research goals and how the team plans to engage farmers, students, and other stakeholders.

In April, Khanna discussed the project and other agricultural advances that are needed to address climate issues in [Illinois Farmer Today](#). SCAPES will focus on row crops, starting with shorter ones like soybeans, she said. But as technology improves to allow solar panels to move up and down or swivel to accommodate agricultural machinery, “there is potential to grow corn this way.”

Basalt Project Featured Twice

Illinois researchers doing work on “enhanced weathering” — spreading basalt rock on farm fields — have been featured twice on major media outlets.

Recently funded for an additional five years as part of the Leverhulme Centre for Climate Change Mitigation (LC3M), team members Carl Bernacchi, Evan H. DeLucia, Ilsa Kantola, and Stephen P. Long discussed in February how the rock dust could boost yields and store vast amounts of carbon in a piece for [Anthropocene magazine](#).

The March edition of the [BBC World News series “Follow the Food,”](#) addressed “turning back the climate clock” by addressing the carbon challenge in agriculture. LC3M researchers Bernacchi and Lisa Ainsworth talked about their work with basalt and the climate change impacts of higher CO₂, respectively.



In the Spotlight: RADAR-X's Vikram Kumar

[Vikram Kumar](#) was always a bright student in elementary and high school, but he felt constrained by the lack of creativity he could engage in when doing schoolwork. Wanting instead to confront questions with undetermined answers, Kumar naturally gravitated toward research — which eventually led him to the Rapid AI-based Dissection of Ashes using Raman and XRF Spectroscopy ([RADAR-X](#)) Project and Principal Investigator Nishant Garg, Assistant Professor of Civil & Environmental Engineering.

“Everything had a correct answer in high school courses, and I did not have any responsibility to make things correct. I did not enjoy that,” Kumar said. “Research is the only place I can be responsible for answering questions that do not have an answer yet.”

Kumar began his pursuit of the unknown at the Indian Institute of Technology (BHU) Varanasi, where he received a bachelor's degree in civil engineering. In spring 2020, he enrolled at the University of Illinois Urbana-Champaign

for his master's degree in civil engineering, and now he's working on his Ph.D. in civil and environmental engineering with a specialization in construction materials.

Kumar is on the operating team for the RADAR-X Project, which finds end uses for municipal solid waste incineration ashes — residues left over from the incineration of trash. However, because researchers have no control over what is in the trash, the ashes can be extremely variable, and different types of ash lend themselves to different uses. So, the first step of RADAR-X is to understand the chemical characteristics of these residues. Then, researchers can identify specific end uses for each chemical composition, purify the ashes, and get to work on implementation.

“My role is to understand the chemical characteristics of incineration ashes via spectroscopic methods,” Kumar said. “Then, I design pretreatment methods that make an ash of a specific chemical composition fit for multiple end uses.”

What's new in research (continued) ...

New Estimation Strategy Improves Soil Carbon Sampling in Agricultural Fields

Since its advent about 10,000 years ago, agriculture has caused a significant amount of soil organic carbon (SOC) to be released into the atmosphere as carbon dioxide, contributing to climate change. Quantifying the amount of SOC in agricultural fields is therefore essential for monitoring the carbon cycle and developing sustainable management practices that minimize carbon emissions.

“Accurate and efficient SOC estimation is essential,” said Eric Potash, a Research Scientist in the Agroecosystem Sustainability Center (ASC) and Department of Natural Resources & Environmental Sciences (NRES). “Governments need to estimate SOC in order to implement policies to minimize climate change. Researchers need to estimate SOC to develop sustainable management practices. And farmers need to estimate SOC to participate in emerging carbon credit markets.”

[In a March publication](#) from the U.S. Department of Energy's (DOE) SMARTFARM Project in *Geoderma*, Potash and other SMARTFARM researchers evaluated strategies for estimating SOC. Their goal was [to develop an estimation strategy that maximizes accuracy while minimizing the number of soil cores](#) sampled.

The [SMARTFARM Project](#), a program led by co-author and Blue Waters Professor in NRES Kaiyu Guan and funded by the DOE's Advanced Research Projects Agency-Energy (ARPA-E),



endeavors to develop a precise solution for measuring and quantifying greenhouse gas emissions and SOC change during the production of crops.

In addition to Potash and Guan (ASC Founding Director), co-authors on this publication include ASC and Crop Sciences Professor D.K. Lee, ASC Associate Director and Crop Sciences Assistant Professor Andrew Margenot, ASC and Plant Biology Emeritus Professor Evan H. DeLucia, ASC and NRES Research Assistant Professor Sheng Wang, and Crop Sciences Postdoctoral Researcher Chunhwa Jang.

CABBI Profile: Kisurb Choe

The word “fun” comes up a lot with [CABBI's Kisurb Choe](#).

Early on, back in South Korea, fun was chasing frogs, building dams, playing with Legos, or reading astronomy magazines from his dad.

At Rice University, it was the Tex-Mex food, the Houston Symphony, his beer-tasting class — even the hurricanes were interesting — and his research. Specifically, working with a bioreactor to grow yeasts and discovering how they can be useful for cosmetics, drugs, food, and other products.

These days, fun involves boating, star-gazing, “building gadgets” — and yes, yeasts.

Choe, a genial Ph.D. student in Jonathan Sweedler's chemistry lab, has found the perfect niche for his love of science and gadgetry: building microbiology tools needed for CABBI's bioenergy research. Conversion scientists are modifying yeasts to make key mole-



cules in fuels and industrial chemicals from renewable plant material instead of petroleum. Sweedler's lab develops mass-spectrometry (MS) screening tools to quickly and efficiently scan large numbers of yeast samples for fatty acids and fatty alcohols — important components of detergents, skin-care products, and other everyday items.

Choe loves the work — specifically the opportunity to work with microbes and “trying random things, failing, and trying again. And I just like microbiology. I like tinkering. I like building things to do new types of experiments. I just like science.”

CROPSR: Tool Accelerates Genetic Discoveries

Commercially viable biofuel crops are vital to reducing greenhouse gas emissions, and [a new tool developed by University of Illinois researchers at CABBI](#) should accelerate their development — and genetic editing advances.

A team led by Postdoc Hans Müller Paul and Crop Sciences Professor Matthew Hudson created CROPSR, the first open-source software tool for genome-wide design and evaluation of guide RNA (gRNA) sequences for CRISPR experiments. The genome-wide approach significantly shortens the time required to design a CRISPR experiment, according to the study published in February in *BMC Bioinformatics*.

Director Testifies

In March, CABBI Director Andrew Leakey testified before the [U.S. House of Representatives Subcommittee on Energy](#) on the bright future of bioenergy and bioproducts!



What's new in education (continued) ...

Q Magazine 4.2: Earth's Guardians

In March, iSEE published the latest online issue of *Q Magazine*, the capstone publication for the [Certificate in Environmental Writing](#) and a unique student-written,

professionally curated publication on the environmental questions of the times.

In Volume 4, Issue 2, our student authors grapple with environmental injustices and agricultural pollution as well as silver linings.

- [Tyler Swanson](#), the Janelle Joseph Environmental Writing Contest grand prize winner, exposes the very real

impact of cryptocurrency on our natural environment.

- [Kratika Tandon](#) interviews Richard Lazarus, an Urbana native, U of I alum, and



a pioneer of environmental law as we know it.

- In a travel piece funded by Joseph, Q Student Editor [Maria Maring](#) provides a firsthand account of protesting on the frontlines of Line 3, an oil pipeline that breaches Anishinaabe territory in Minnesota.

- [Kayla Vittore](#) explores the possibilities of biofuels as a premier energy source on the horizon.

- [Zara Nyhus](#) brings our attention to how cover crops can help conserve essential terrain in Illinois.

- [Grace Finnell-Gudwien](#) guides you through the mysterious world of glowing algae and bioluminescence — and what the potential scientific benefits might be.

- And [Erinn Dady](#) shares the natural beauty of Atherton Island Natural Area along the Wabash River, an orchard-turned-junkyard-turned-restored habitat.

Environmental Leadership Program: A Rewarding Experience

iSEE's first full Environmental Leadership Program (ELP) was a rousing success under the leadership of Associate Director for Education & Outreach Luis Rodríguez, Academic Instructor/Advisor Eric Green, and Graduate Student [Paul Gharzouzi](#).

They guided cohort of 21 students through a two-day intensive introduction session online in January, followed by eight weeks of in-person working sessions and visits with guest speakers from academia, industry, nonprofits, and government.

The program — supported by a generous donation from the Alvin H. Baum Family Fund — culminated over Spring Break, when students made presentations at the Urbana and Champaign city council meetings and took a two-day trip to Springfield to visit state offices and nongovernmental organizations. Groups of students even [met with state legislators to advocate](#) for environmental bills under consideration.

Students were effusive in their praise for the program and the enlightenment and empowerment they felt after going through it (click the photo to watch an [overview video](#) of the ELP and hear the students' testimonials about it!).

For more details on the impact of this program — and “what was easily the most gratifying professional experience I’ve ever



had” — read the blog by Kratika Tandon, an iSEE Communications Intern and a member of the 2022 cohort: [“Inside the ELP: An Immersive Experience.”](#)



Thousands from Campus Engage in Earth Month Activities, Events, Lectures

Student groups, Facilities & Services (F&S), and iSEE put together several successful [Earth Month](#) events in April, drawing thousands of participants throughout the month.

Among the highlights:

- Dozens of people participated in the monthlong [Water Reduction Challenge](#);
- Two [Illini Lights Out](#) events (*total savings details on Page 6*) drew more than 270 volunteers;
- The [Red Bison](#) student organization helped plant more than 1,000 young trees at Warbler Ridge Conservation area in early April;
- Dozens attended an Earth Month Trivia event and the Sustainability Grammys (co-sponsored by the Student Sustainability Leadership Council [SSLC] and the Illini Union Board), where student organizations were recognized for their activities throughout 2021-22;
- More than 50 people registered for April's "TED Talk: Eco Edition" featuring Jennifer Walling, Executive Director of the Illinois Environmental Council;
- Students for Environmental Concerns (SECS) and iSEE reignited the [Earth Month Clothing Swap](#), and 90 people participated in this reduce/reuse event at Channing Murray Foundation;
- More than 60 people interacted with environmental law pioneer Richard Lazarus, an Urbana native and U of I alumnus who delivered a [MillerComm Lecture](#) titled "The Rule of Five: Making



Climate History at the Supreme Court";

- The annual [Charles David Keeling Lecture](#), featuring NASA Goddard Institute of Space Studies Director Gavin Schmidt presenting "Success, Progress, and Challenges in Climate Modeling" drew more than 85 people online;
- Hundreds of campus community members interacted with iSEE and dozens of student and community organizations during Green Quad Day, sponsored by SSLC; and
- The annual Arbor Day celebration, at which F&S planted a tree near Mumford Hall, drew dozens more to participate in the event, which also featured iSEE's "tree-via."

The Impact of Illini Lights Out ...

Our featured volunteer event drew more than 1,400 participants over 10 events upon relaunch during the past academic year!

Check out our bulb counting tutorial video.



BULBS TURNED OFF

Spring 2022: 22,636
2021-22 year: 36,578
Since 2016: 188,914

TONS CO₂ EQUIVALENT PREVENTED

Spring 2022: As much as 27.7
2021-22 year: As much as 44.6
Since 2016: As much as 239.1

APPROXIMATE ENERGY BILL SAVINGS

Spring 2022: As much as \$3,284
2021-22 year: As much as \$5,300
Since 2016: As much as \$32,450

Big Thanks to Our '21-22 ILO Coordinator, Intern Jenna Schaefer!

A New 'Chapter' for Greener Campus Programming in '21-22

More than three dozen campus and community events, offices, and sorority and fraternity chapters were recognized for their sustainability efforts in 2021-22 under iSEE's Certified [Greener Campus Programs](#)!

Each certification means that organizers, administrators, staffers, and students took simple steps to create a more sustainable workspace, activity, or living environment through the Certified Green Office, Certified Green Events, and Certified Green Chapter programs.

iSEE extends its heartfelt thanks to Campus Sustainability Intern Zoe Huspen for her leadership role!

[Seven offices](#) on and off campus won Gold Certification, including the U of I Center for

Social & Behavioral Science and Visit Champaign County.

A total of [28 events](#) were certified, from the Chancellor's "State of the University" to CU at Home's "One Winter Night" to the Division of Intercollegiate Athletics Illini Track & Field Invitational. The Chancellor's Office of Special Events had five events certified, including the May 14 Commencement! Finally, Alpha Phi sorority, Zeta Psi fraternity, and Alpha Kappa Psi Business

Fraternity were the latest [chapters to be gold-certified](#).

And to help researchers and lab managers contribute to the overall sustainability of our campus, Facilities & Services and iSEE also created a [Greener Labs Inventory Toolkit](#) for sustainable lab practices!



Campus Earns EPA Accolades

Congratulations to the University of Illinois Urbana-Champaign, which made the U.S. Environmental Protection Agency's (EPA) [top-30 list of the largest on-site green power users](#) in the Green Power Partnership (GPP).

The university ranks No. 25 nationally after producing more than 16,000 megawatt-hours (MWh) of green power between July 2020 and June 2021. Because of the output from two utility-scale solar farms and multiple rooftop arrays, the Urbana campus is now third among U.S. universities in on-site clean power production.