CSBE/ASABE Annual International Meeting
Toronto, July 13-16, 2025
CONTINUING PROFESSIONAL DEVELOPMENT COURSES

Continuing Professional Development courses are brought to AIM by ASABE member professionals in their field as an added value to the overall program. Each course is available to add on to your AIM registration prior to June 23. All qualify for professional development hour credits as well. Please note that these are all on Sunday and many are at the same time.

CPD1 How will a "One Water" Approach Impact Agriculture?

Sunday, July 13 8:00am - 12:00pm

Description:

In this age of changing climate and increasing demands on water resources Communities must assess water management approaches that address all sources of water as a benefit to the community. This is the One Water approach encouraged by water management entities worldwide. Domestic wastewater, Stormwater, harvested rainwater, drainage water, industrial wastewater and other sources of water must be assessed as a part of the available water supply available to the community. This session is intended to describe some of the challenges and opportunities for this One Water approach for Agricultural Engineers. The professional development session is intended to describe: 1. The one water approach and potential impacts of changing climate to the efforts 2. Describe alternative sources of and quality of water available in communities 3. Describe treatment options to produce water fit for purpose 4. Describe options available to distribute water fit for purposes 5. Describe management options and regulatory issues associated with one water efforts.

Target Audience:

Engineers and water resource managers, process engineers, operators and managers of regional water authorities and students can all benefit from One Water efforts.

Instructors:

Dr. Anish Jantrania, PE, MBA, Texas A&M University;
Dr. A. Robert Rubin, NC State University;
Dr. June Wolfe, Texas A&M AgriLife Research;
Dr. Rajiv Srivastava, Texas A&M University

Cost: $50 **Minimum required:** 15

CPD2 Computational Fluid Dynamics Simulation and Controlled Environment Agriculture

Sunday, July 13 8:00am - 12:00pm

Description:

This CPD course explores Computational Fluid Dynamics (CFD) as a tool for agricultural applications, with a focus on Controlled Environment Agriculture (CEA). Specifically, we will cover the different modes of energy transfer in CEA (conduction, convection, radiation, and evaporation), key CFD strategies for modeling CEA cases, and the fundamentals of CFD, including numerical simulation methods, their advantages, limitations, and challenges. Participants should bring a laptop. Learning outcomes: (1) Understand basic heat and mass transfer phenomena in the context of CEA (2) Learn the fundamental principles of CFD modeling and processes (3) Gain hands-on experience with CFD software through case examples. Sponsored by YPC.

Target Audience:

Although the case studies will be on CEA, CFD can be useful in any Agricultural process. This course is intended for beginners who want to explore CFD as a tool in agricultural applications.

Instructor:

Hanwook Chung, Agricultural and Biosystems Engineering Department, Iowa State University
LinkedIn Profile: https://www.linkedin.com/in/hanwook-chung-016564248/

Cost: $ 25 **Minimum required:** 15

CPD3 Application for LLMs (ChatGPT) in Ag, Food & Biosystems Engineering

Sunday, July 13 9:00am - 12:00pm

Description:

This interactive 3-hour workshop explores the transformative potential of Large Language Models (LLMs) like ChatGPT in Ag, Food, and Biosystems Engineering. Participants will discover how LLMs can streamline research, enhance decision-making, and automate technical writing. Through real-world case studies and hands-on activities, attendees will learn to optimize LLMs for tasks such as crop yield prediction, sustainability reporting, and stakeholder communication. No prior experience with LLMs is necessary, making this session ideal for students, researchers, and professionals eager to integrate AI-driven tools into their workflows and drive innovation in the agri-food sector. Participants will leave the workshop with (1) Practical skills to use LLMs effectively in their work. (2) Insights into potential applications and limitations. (3) Resources for integrating LLMs into their professional workflows. Sponsored by YPC.

Target Audience:

This CPD session targets professionals, researchers, students, and industry practitioners in Ag, Food, and Biosystems Engineering, focusing on integrating AI tools like LLMs into workflows. Ideal for those seeking practical skills in data analysis, technical writing, and decision-making, with no prior AI experience required. Enthusiasm for technology is a plus!

Instructor: Sushant Mehan, South Dakota State University (YPC Past Chair), www.linkedin.com/in/sushantmehan

Cost: $20 **Minimum required:** 20

CPD4 Active Learning: Successes in Core and Project-Based Courses

Sunday, July 13 12:00pm - 4:00pm

Description:

Active Learning is the holy grail of learning but its successful implementation for a particular group is anything but straightforward. The workshop will share carefully developed active learning resources targeted toward biological or agricultural engineering curricula. Anyone with a teaching commitment, with core course instructors in particular should find this workshop worthwhile. Guided learning worksheets for instruction in problem solving in a core course (heat and mass transfer) and a project-based course (computer-aided engineering) will be shared that have been successfully student tested over many years. Versions of these courses are present in most curricula, making the learning outcomes relevant to many instructors, as the worksheets are readily adaptable to other courses. The specific learning outcomes are as follows: At the end of the workshop, the learners will be able to 1. Identify the principles of active learning and

how it critically benefits every student. 2. Describe several activities and approaches to implement the principles in a core biological engineering course with heat and mass transfer as an example, and in a broader application-focused modeling course. 3. Apply the principles to develop paper- and web-based materials for active learning in your course. 4. Assess the learning process; Examples of assessment data collected from multiple years will be shared.

Target Audience:

Any teaching faculty, particularly those considering including active learning or those teaching heat and mass transfer. Prospective faculty, including Ph.D. students and post-doctoral associates.

Instructor:

Ashim Datta, Cornell University

Instructor Profile:

Ashim Datta, Cornell University, has led the development of core courses in biological engineering, particularly the heat and mass transfer course in biological engineering for 35 years. He also developed a course on mathematical modeling in biological engineering for design of products and processes, and one on food physics and its modeling. He has written textbooks and taught these courses implementing the latest pedagogies for learning. He co-led a large active learning project funded internally by Cornell University where two of the courses have been transformed into active learning. He is particularly interested in sharing the development and assessment data to obtain feedback from fellow instructors.

Cost: $75 **Minimum required:** 10

CPD5 Optimizing Drivetrain Design with High-Fidelity Simulation of Deformable Tires on Soil

Sunday, July 13 12:00pm - 4:00pm

Description:

Objective 1: Gain proficiency in key simulation software, including Pratt & Miller (PM) FlexTire (FEA), Altair EDEM (Discrete Element Method), Altair MotionSolve (Multi-body Dynamics), and Altair HyperStudy (Optimization & Machine Learning), to enable the virtual testing and performance evaluation of heavy equipment machinery. Objective 2: Master the integration of EDEM, PM FlexTire, and HyperStudy to calibrate PM solver inputs by accurately matching the tire's vertical force-deformation curve and rolling resistance characteristics. Objective 3: Develop the capability to predict a tractor's tractive performance on a soil bed by integrating EDEM, PM FlexTire, and MotionSolve for accurate simulation of soil-tire interaction dynamics.

Target Audience:

Engineers, researchers, and simulation specialists involved in off-road vehicle design, heavy machinery development, and soil-tire interaction analysis, aiming to optimize drivetrain performance using advanced multi-physics simulation tools.

Instructor:

Eric Veikle, Altair Engineering LLC

Instructor Profile:

Dr. Eric Veikle holds a Ph.D. in Agricultural & Biological Engineering and has over a decade of industry experience in simulating machine interactions with soil and crop materials for off-road equipment. As a Lead

Solution Engineer at Altair, he specializes in Discrete Element Method (DEM) simulations, helping organizations optimize their designs through advanced modeling techniques.

Cost: $50 **Minimum required:** 15

CPD6 Large Language Models and Foundation Models in Agriculture: Bridging Theory and Practice

Sunday, July 13 12:00pm - 4:00pm

Description:

Join us for the 2nd engaging CPD session delving into the transformative realm of large language models (LLMs) and foundation models (FMs) applied to practical agricultural challenges. As revolutionary technologies like ChatGPT and Segment Anything Models reshape the landscape of various fields, the agricultural sector undergoes a similar transformative journey. While the journey of exploring the vast potential of LLMs and FMs in agriculture is ongoing, this session endeavors to provide participants with a comprehensive understanding of how cutting-edge machine learning techniques, particularly LLMs and FMs, are applied to revolutionize the agricultural landscape. Through compelling real-world case studies, attendees will gain valuable insights into the diverse applications of these models in agriculture, including smart crop management, innovative plant breeding methodologies, advanced livestock farming practices, and the integration of agriculture robots, among others. Following the session, we will host an expert panel discussion, offering a platform for in-depth conversations and insights from industry leaders and researchers.
Learning Outcomes: Grasp the fundamentals and technical background of Large Language Models (LLMs) and Foundation Models (FMs). Understand the development process of LLMs and FMs, from training methodologies to real-world deployment. Gain insights into practical applications, learning how to leverage LLMs and FMs for smart agriculture, including crop management, plant breeding, and robotics. Engage in an expert-led panel discussion, exploring challenges, opportunities, and future directions of AI in agriculture.

Target Audience:

This CPD session is designed for agricultural professionals, agronomists, farm managers, and researchers interested in incorporating advanced machine learning techniques (e.g., large language models (LLMs) and foundation models (FMs)) into their agricultural practices. Professionals at various career stages, from entry-level to experienced practitioners, will benefit from the session.

Instructors:

Jiajia Li, Michigan State University;
Dong Chen, Mississippi State University;
Zhaojian Li, Michigan State University

Instructor Profiles:

Jiajia Li is currently a Ph.D. candidate at Michigan State University, and her research interests include deep learning, computer vision, as well as cutting-edge techniques such as large language models (LLMs) and foundation models (FMs), with applications in smart agriculture and robotics. She has published her findings in prestigious journals such as Computers and Electronics in Agriculture and Frontiers in Plant Science. She is a recipient of the 2024 ASABE ITSC Paper Award.

Dr. Dong Chen is a tenure-track assistant professor at Mississippi State University. His research interests lie in deep learning and its applications in smart agriculture and robotics. He has published his findings in

journals such as Computers and Electronics in Agriculture and Smart Agriculture Technology. He is a recipient of the 2023 ASABE ITSC Paper Award.

Dr. Zhaojian Li is a Red Cedar Distinguished Associate Professor at Michigan State University. His main research interests lie at the intersection of machine learning and control theory, with applications to robotics, smart agriculture, and other complex systems. He is a recipient of the 2021 NSF CAREER Award and the winner of the 2023 Rain Bird Engineering Concept of the Year Award.

Cost: $50 **Minimum required:** 15

CPD7 Reviewer Certification Training

Sunday, July 13 2:00pm - 4:00pm

Description:

The learning outcomes will include knowledge of the journal article review process, additional skills in conducting a journal review, and additional knowledge in the ASABE journal system.

Target Audience:

Members interested in learning more about the journals and the review process and members interested in becoming a quality reviewer.

Instructors:

Kasiviswanathan Muthukumarappan, South Dakota State University;
Sudhagar Mani, University of Georgia;
Patricia Smith, Texas A&M University

Cost: $10 **Minimum required:** 15

CPD8 Develop Custom Autonomous UGVs & UAVs from the Ground Up for Hands-on Learning

Sunday, July 13 8:00am - 4:00pm

Description:

With the increasing adoption of UGVs and UAVs in agriculture, professionals require hands-on expertise in UGV and UAV design, control, and autonomy to effectively address industry challenges. Often, existing UGV, especially UAV platforms present limitations in fundamental-level control, making certain autonomous operations difficult to implement. This session provides attendees with practical knowledge and technical skills to develop, deploy, and optimize custom UGVs and UAVs tailored for precision agriculture. Additionally, this session fosters collaboration between UGVs and UAVs for carrying out the mission. By integrating ROS2 and Software-In-The-Loop (SITL) simulations, participants gain real-world experience in developing and testing autonomous systems, ensuring they are well-prepared to implement these technologies in agricultural settings.

Outcome 1: Understand key UAV and UGV components, including hardware, sensors, and flight controllers.
Outcome 2: Learn to design, assemble, and program UAVs and UGVs for autonomous agricultural tasks.
Outcome 3: Learn to use Software-In-The-Loop (SITL) simulations for UAV testing.
Outcome 4: Integrate and utilize ROS2 for autonomous navigation and multi-robot coordination. Learn troubleshooting and optimization techniques for UAV and UGV performance.
Outcome 5: Explain applicability such as crop monitoring, field mapping, and cooperative autonomous ground and aerial navigation.

Target Audience:

This session is designed for professionals, researchers, engineers, and students interested in UGV and UAV technology for agriculture. It is particularly relevant for those in precision agriculture, agronomy, environmental monitoring, and automation in farming.

Instructors:

Krishna Muvva, University of Nebraska-Lincoln;
Dr. Nipuna Chamara, University of Nebraska-Lincoln;
Dr. Santosh Pitla, University of Nebraska-Lincoln

Instructor Profiles:

Krishna Muvva is a Ph.D. candidate at UNL specializing in aerial robotics and autonomous UAVs. His expertise lies in designing and implementing custom UAVs from scratch, integrating advanced perception and control systems to enable autonomous operation. His research has been published in leading aerospace and robotics conferences, and he has hands-on experience developing UAV solutions for real-world applications.

Dr. Nipuna Chamara is a faculty member at UNL with experience in artificial intelligence, IoT, and automation solution development for precision agricultural applications. This session will leverage their combined expertise to provide participants with a comprehensive understanding of UAV development, from hardware integration to autonomy.

Dr. Santosh Pitla is a faculty member at UNL with extensive experience in agricultural automation, robotics, and UAV applications in precision agriculture. His research focuses on developing autonomous systems for agricultural operations, integrating cutting-edge technology to enhance efficiency and sustainability.

Cost: $125 **Minimum required:** 10