

2026 ADVANCED SCHOOL ON MICROIRRIGATION FOR CROP PRODUCTION

March 30 – April 3, 2026

Day 1 (March 30, 2026) – Topics: General Aspects of Microirrigation

- ✓ Introduction to Microirrigation: Definition; Advantages and Constraints; Types of Microirrigation Systems; Microirrigation Use Worldwide; Enabling Conditions for Successful Adoption of Microirrigation (J. Ayars)
- ✓ Hydrological and Basin-scale Considerations for Microirrigation (P. Steduto)
- ✓ Water Delivery Requirements for Successful Adoption of Microirrigation (E. Rothberg)
- ✓ Economic and Financial Considerations for Adapting Water Delivery Systems and Services to Microirrigation (FAO-CFI)
- ✓ Microirrigation Systems' Components and Functions (T. Devol)
- ✓ Water Movement from the Soil and through the Plant (P. Steduto)
- ✓ Measuring and Regulating Plant-Water Status (K. Shackel)
- ✓ Water Movement and Storage in Various Soil Types under Microirrigation (B. Sanden)
- ✓ Methods and Tools for Microirrigation Scheduling in Specialty Crops (D. Zaccaria; M. Cahn)
- ✓ Using Microirrigation for Frost Protection and Evaporative Cooling (R. Snyder)
- ✓ Energy Demand and Supply Dynamics with Microirrigation (A. Aghajanzadeh)

08:00 – 08:30 am: Coffee and Refreshments

08:30 – 08:45 am: Welcome to the Advanced Microirrigation School for Crop Production

Session 1 – General Introduction and Hydrologic/Basin-scale Considerations. *Coord's: J. Ayars; P. Steduto*

08:45 – 09:00 am: Introduction to Microirrigation (J. Ayars)

09:00 – 09:20 am: Does Microirrigation Save Water on a Basin Scale? (P. Steduto)

09:20 – 09:50 am: Adapting Different Water Delivery Systems and Services to Microirrigation (E. Rothberg)

09:50 – 10:30 am: Economic and Financial Considerations for Adapting Water Delivery Systems and Services to Microirrigation (G. Munoz)

10:30 – 10:50 am: Questions & Answers

10:50 – 11:15 am COFFEE BREAK

Session 2 – The Soil-Plant-Microirrigation Continuum: Water Application, Uptake, and Regulation. *Coord's: P. Steduto; K. Shackel*

11:15 – 11:40 am: Microirrigation Systems' Components and Functions (T. Devol)

11:40 – 12:00 pm: Water Movement and Storage in Various Soil Types under Microirrigation (B. Sanden)

12:00 – 12:20 pm: Water Movement from the Soil through the Plant (P. Steduto)

12:20 – 12:45 pm: Measuring and Regulating Plant-Water Status (K. Shackel)

12:45 – 1:00 pm: Questions & Answers

1:00 – 2:00 pm LUNCH

Session 3 – Scheduling Water Applications, Microclimate Management, and Energy Dynamics in Microirrigation Systems. *Coord's: D. Zaccaria; M. Cahn*

2:00 – 2:30 pm: Methods and Tools for Microirrigation Scheduling in Specialty Crops (D. Zaccaria)

2:30 – 3:00 pm: Using Microirrigation for Frost Protection and Evaporative Cooling (R. Snyder)

3:00 – 3:30 pm: Energy Demand and Supply Dynamics with Microirrigation (A. Aghajanzadeh)

3:30 – 3:45 pm: Questions & Answers

3:45 – 4:00 pm COFFEE BREAK

4:15 - 5:30 pm Outdoor Field Session: Measuring Soil and Plant Water Status (M. Cahn; K. Shackel; C. Albuquerque)

6:00 – 8:00 pm – Social Dinner with Sponsors and Exhibitors at the UC Alumni Center

6:30 – 7:30 pm – Tributes to Irrigation Research Leaders (George H. Hargreaves; Jack Keller; Freddy R. Lamm; Claude J. Phene)

Day 2 (March 31, 2026) - Topics: Microirrigation System Design and Operation

- ✓ Design Principles for Resource-Efficient Microirrigation Systems (D. Zaccaria)
- ✓ Hydraulics for Microirrigation Systems (O. Lagos)
- ✓ Design Considerations for Sub-surface Drip Irrigation (J. Ayars)
- ✓ Filtration and Fertigation Systems (K. Bali; Z. Wang)
- ✓ Design and Operational Considerations for Pumps, Valves, and Flow Measurement (T. Devol)
- ✓ Microirrigation Systems Operation, Monitoring, and Maintenance (M. Cahn)
- ✓ Performance Evaluation of Microirrigation Systems and Financial Considerations (J. Anshutz)
- ✓ Microirrigation System Automation and Monitoring (A. Rehnvall; B. Sanden; J. Nichols)

08:30 – 09:00 am: Coffee and Refreshments

Session 5 – Design Criteria and Hydraulics for Microirrigation Systems. *Coord's: O. Lagos; D. Zaccaria*

- 09:00 – 09:30 am: Design Criteria and Procedure for Resource-Efficient Microirrigation (D. Zaccaria)
- 09:30 – 10:00 am: Hydraulics for Microirrigation Systems (O. Lagos)
- 10:00 – 10:30 am: Subsurface Drip Irrigation System Design Considerations (J. Ayars)
- 10:30 – 10:45 am: Questions and Answers

10:45 – 11:00 am COFFEE BREAK

Session 6 – Filtration and Fertigation Systems, Pumps, Valves, and Flow/Pressure Control Devices. *Coord's: K. Bali; Z. Wang*

- 11:00 – 11:25 am: Filtration Systems, Operation, and Monitoring (K. Bali)
- 11:25 – 11:50 pm: Chemical Injection Systems, Operation, and Monitoring (Z. Wang)
- 11:50 – 12:15 pm: Design and Operational Considerations for Pumps, Valves, and Flow Measurement (T. Devol)
- 12:15 – 12:30 pm: Questions and Answers

12:30 – 1:30 pm LUNCH

Session 7 – Operation, Monitoring, Maintenance, and Field Evaluation of Microirrigation Systems. *Coord's: M. Cahn; J. Anshutz*

- 1:45 – 2:45 pm: Field session on Microirrigation System Evaluation
- Monitoring Microirrigation Systems and Troubleshooting (M. Cahn)
 - Evaluating Field Performance of Microirrigation Systems (J. Anshutz)
- 3:00 – 3:30 pm: A Novel Tool for Evaluating Microirrigation Performance and Financial Considerations (J. Anshutz)

3:30 – 3:45 pm COFFEE BREAK

Session 8 – Microirrigation System Automation and Monitoring. *Coord's: B. Sanden; J. Nichols*

- 3:45 – 4:15 pm: Principles of Irrigation Automation (A. Rehnvall)
- 4:15 – 4:45 pm: Automation and System Monitoring Components (B. Sanden)
- 4:45 – 5:15 pm: Success Stories in Implementing Microirrigation Automation (J. Nichols)
- 5:15 – 5:30 pm: Questions & Answers

5:30 pm ADJOURN

5:45 – 7:45 pm – Social Hours and Refreshments with Sponsors and Exhibitors at UC Davis Conference Center

Day 3 (April 1, 2026) - Topics: Microirrigation Management for Various Crops

- ✓ Management of Microirrigation for: Nut Crops; Fruit Crops; Subtropical Crops; Grape Vineyards; Field and Agronomic Crops; Vegetable Crops; Berry Crops (A. Fulton; T. DeJong; B. Faber; M. Fidelibus; K. Bali; M. Cahn; A. Biscaro)
- ✓ Nutrient Management Strategies with Microirrigation Systems (D. Amaral)
- ✓ Applying Agrochemicals through Microirrigation Systems (Z. Wang)
- ✓ Irrigating with Biological Effluents and Recycled Water with Microirrigation Systems (G. Vivaldi)
- ✓ Irrigation Water Quality Considerations with Microirrigation (G. Vivaldi)
- ✓ Salinity Management with Microirrigation (E. Scudiero; J. Ayars)

07:30 – 08:00 am: Coffee and Refreshments

Session 9 – Microirrigation Management Strategies for Perennial Crops. *Coord's: M. Cahn; D. Zaccaria*

- 08:00 – 08:30 am Nut Crops – Almond and Walnut (A. Fulton)
- 08:30 – 09:00 am Nut Crops – Pistachio (B. Sanden)
- 09:00 – 09:30 am: Fruit Crops (T. DeJong)
- 09:30 – 10:00 am: Subtropical Crops – Citrus and Avocado (B. Faber)
- 10:00 – 10:30 am: Grape Vineyards (M. Fidelibus)
- 10:30 – 10:45 am: Questions & Answers

10:45 – 11:00 am COFFEE BREAK

Session 10 – Microirrigation Management Strategies for Annual and Berry Crops. *Coord's: K. Bali; A. Biscaro*

- 11:00 – 11:30 am Field and Agronomic Crops (K. Bali)
- 11:30 – 12:00 pm: Vegetable Crops (M. Cahn)
- 12:00 – 12:30 pm: Berry Crops (A. Biscaro)
- 12:30 – 12:45 pm: Questions & Answers

12:45 – 1:45 pm LUNCH

Session 11 – Application of Chemicals and Biological Effluents. *Coord's: M. Cahn; O. Lagos*

- 2:00 – 2:30 pm: Nutrient Management Strategies with Microirrigation Systems (D. Amaral)
- 2:30 – 3:00 pm: Applying Agrochemicals through Microirrigation Systems (Z. Wang)
- 3:00 – 3:30 pm: Irrigating with Biological Effluents and Recycled Water with Microirrigation Systems (G. Vivaldi)
- 3:30 – 3:45 pm: Questions & Answers

3:45 – 4:00 pm COFFEE BREAK

Session 12 – Salinity Management with Microirrigation. *Coordinators: J. Ayars; K. Bali*

- 4:00 – 4:30 pm: Irrigation Water Quality Considerations with Microirrigation (G. Vivaldi)
- 4:30 – 5:00 pm: Quantifying and Mapping Soil Salinity and Sodicity (E. Scudiero)
- 5:00 – 5:30 pm: Leaching and Salinity Management Practices (J. Ayars)
- 5:30 – 5:45 pm: Questions & Answers

6:00 – 6:30 pm: School Lectures Closing and Delivery of Completion Certificates (J. Ayars; O. Lagos; D. Zaccaria; K. Bali; M. Cahn)

6:30 pm: ADJOURN

Day 4 (April 2, 2026): Field/Demonstration Visits in the San Joaquin Valley (Modernized Irrigation Water Delivery Systems; Irrigation/Fertigation Automation; Nut Crops; Fruit Crops). Coordinators: D. Zaccaria; C.M. Culumber; K. Bali

7:00 am: Departure from Davis and drive to Turlock, CA

Visit 1 – Modernized Irrigation Water Delivery Systems: Turlock Irrigation District (TID) – Turlock, CA

09:00 – 11:00 am: Turlock Irrigation District Headquarter (TID Personnel; E. Rothberg)

11:00 – 11:30 am: Early Lunch at Turlock Irrigation District Headquarter (lunch will be catered at TID)

11:45 – 12:30 pm: Laterals 7 and 8; Ceres Regulating Reservoir, Automated Gates and Irrigation Delivery Offtakes + Q&A (TID Personnel; E. Rothberg)

12:30 – 2:30 pm: Drive to Hanford, CA

Visit 2 – HotSpot Ag: Hanford, CA

2:30 – 3:00 pm: Rationale and Metrics for Performance Evaluation of Microirrigation Systems (J. Anshutz)

3:00 – 3:30 pm: Automation of Microirrigation and Fertigation for Fruit and Nut Crops and Vineyards + Q&A (J. Nichols)

Visit 3 – Nichols Farms: Hanford, CA

3:45 – 4:45 pm: Irrigation, Nutrient, and Salinity Management in Pistachio and Almond Production Orchards + Q&A (D. Amaral; C.M. Culumber; J. Nichols; D. Zaccaria)

4:45 pm ADJOURN

6:30 pm: Dinner and overnight stay in Visalia, CA at participants' expense

Day 5 (April 3, 2026): Field/Demonstration Visits in Salinas/Monterey Areas (Vineyards, Vegetable and Berry Crops). Coordinators: M. Cahn; L. Bettiga; C. Albuquerque

7:00 am: Departure from hotel in Visalia, CA and drive to Soledad, CA

Visit 1 – Zabala Vineyards (Soledad, CA)

9:30 – 11:30 am CIMIS Weather Station; Measurement of Grapevine Water Status; Irrigation Scheduling with Drip Systems in Vineyards; Validation of Satellite Remote Sensing-based ET versus ground-based ET for Vineyards; Q&A (M. Cahn; L. Bettiga; C. Albuquerque)

11:45 – 1:00 pm LUNCH (lunch meals will be catered at a lunch meeting place)

Visit 2 – Cool-season Vegetable Production Farm (Soledad, CA)

1:30 – 3:00 pm: Drip Irrigation System Design and Management; Irrigation and Nutrient Management Practices for Cool-season Vegetables; Q&A (M. Cahn)

Visit 3 – Berry Crops Production Farm (Salinas, CA)

3:30 – 4:30 pm: Irrigation System Design; Irrigation and Nutrient Management Practices for Strawberry; Q&A (M. Cahn)

4:45 pm ADJOURN

5:00 – 8:00 pm: Vans drive back to Davis, CA.

List of Instructors, Titles, and Affiliations

- 1) James Ayars: Research Agricultural Engineer (retired) - USDA-Agriculture Research Service, Fresno, CA
- 2) Pasquale Steduto: Senior Water Scientist, LAWR Department - University of California, Davis
- 3) Eric Rothberg: Sales Manager North America - Rubicon Water, Fort Collins, CO
- 4) Giovanni Munoz: Chief East and Southern Africa Service - FAO-UN Center for Investment
- 5) Tom Devol: Professional Irrigation Designer – Chico, CA
- 6) Blake Sanden: Agronomy and Irrigation Advisor (Emeritus) - University of California Cooperative Extension Kern County
- 7) Kenneth Shackel: Professor, Department of Plant Sciences - University of California, Davis
- 8) Daniele Zaccaria: Professor & Agricultural Water Management Specialist, LAWR Department - University of California, Davis
- 9) Richard Snyder: Bio-meteorology Specialist (Emeritus), LAWR Department - University of California, Davis
- 10) Arian Aghajanzadeh: Founder of Klimate Consulting, LLC – San Francisco, CA.
- 11) Michael Cahn: Irrigation and Water Resource Advisor – University of California Cooperative Extension Monterey County
- 12) Caetano Albuquerque: Professor, Department of Biology and Chemistry – California State University Monterey Bay
- 13) Octavio Lagos: Professor, School of Agricultural Engineering - University of Concepcion, Campus of Chillan (Chile)
- 14) Khaled Bali: Irrigation Water Management Specialist – University of California Agriculture and Natural Resources
- 15) Zheng Wang: Vegetable Crop Advisor - University of California Cooperative Extension Stanislaus County
- 16) James Anshutz: Founder AGH2O – Fresno, CA
- 17) Anders Rehnvall: CEO at EZE System Inc. - Folsom, CA
- 18) James Nichols: President – HotSpot Ag, Hanford, CA
- 19) Allan Fulton: Irrigation and Water Resource Advisor (Emeritus) – University of California Cooperative Extension Tehama, Glenn, Colusa, and Shasta Counties
- 20) Theodore DeJong: Distinguished Professor & Pomologist Emeritus, Department of Plant Sciences- University of California, Davis
- 21) Ben Faber: Subtropical Crop Advisor - University of California Cooperative Extension Ventura County
- 22) Matthew Fidelibus: Professor of Viticulture and Enology for Cooperative Extension, Department of Viticulture and Enology - University of California, Davis
- 23) Andre Biscaro: Irrigation Advisor – University of California Cooperative Extension Ventura County
- 24) Doug Amaral: Professor & Extension Specialist, Department of Crop & Soil Sciences, University of Georgia
- 25) Gaetano Alessandro Vivaldi: Professor - Universita' degli Studi Aldo Moro, Bari (Italy)
- 26) Elia Scudiero: Associate Professor, Department of Environmental Sciences – University of California, Riverside
- 27) Catherine Mae Culumber: Nut Crop Advisor – University of California Cooperative Extension Fresno County

Email contacts of Instructors

- 1) James Ayars: james.ayars@gmail.com
- 2) Pasquale Steduto: psqlsdt@gmail.com
- 3) Eric Rothberg: Eric.Rothberg@rubiconwater.com
- 4) Giovanni Munoz: giovanni.munoz@fao.org
- 5) Tom Devol: tom.devol@live.com
- 6) Blake Sanden: blsanden@ucanr.edu
- 7) Kenneth Shackel: kashackel@ucdavis.edu
- 8) Daniele Zaccaria: dzaccaria@ucdavis.edu
- 9) Richard Snyder: rsnyder@ucdavis.edu
- 10) Arian Aghajanzadeh: arian@climateconsulting.com
- 11) Michael Cahn: mdcahn@ucanr.edu
- 12) Caetano Albuquerque: calbuquerque@csumb.edu
- 13) Octavio Lagos: octaviolagos@udec.cl
- 14) Khaled Bali: kmbali@ucanr.edu
- 15) Zheng Wang: zzwwang@ucdavis.edu
- 16) James Anshutz: jshutz12345@gmail.com
- 17) Anders Rehnvall: arehnvall@ezesys.com
- 18) James Nichols: james@hotspotag.com
- 19) Allan Fulton: aefulton@ucanr.edu
- 20) Theodore DeJong: tmdejong@ucdavis.edu
- 21) Ben Faber: bafaber@ucdavis.edu
- 22) Matthew Fidelibus: mwfidelibus@ucanr.edu
- 23) Andre Biscaro: asbiscaro@ucanr.edu
- 24) Doug Amaral: amaral@uga.edu
- 25) Gaetano Alessandro Vivaldi: gaetano.vivaldi@uniba.it
- 26) Elia Scudiero: elia.scudiero@ucr.edu
- 27) Catherine Mae Culumber: cmculumber@ucanr.edu