INTERNATIONAL SCHOOL ON MICROIRRIGATION FOR CROP PRODUCTION

University of California, Davis - October 13-17, 2025

Final Schedule of Class Lectures at UC Davis Conference Center (Days 1-3) and Field/Demonstration Visits (Days 4-5)

<u>Day 1 (October 13, 2025)</u> – Topics: General Aspects of Microirrigation

- ✓ Introduction to Microirrigation: Definition; Advantages and Constraints; Types of Microirrigation Systems; Statistics on 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)
- ✓ Microirrigation Systems' Components and Functions (I. Bisconer)
- ✓ Water Movements and Storage with Microirrigation in Various Soil Types (B. Sanden)
- ✓ Plant-Water Dynamics (K. Shackel)
- ✓ Soil-Plant-Atmosphere Continuum (P. Steduto)
- ✓ Methods and Tools for Microirrigation Scheduling for Orchards and Vineyards (D. Zaccaria; M. Cahn)
- ✓ Irrigation for Frost Protection and Evaporative Cooling (R. Snyder)
- ✓ Considerations on Sub-surface Drip Irrigation (J. Ayars)

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

08:30 – 08:45 am: Welcome to the International School on Microirrigation and Logistic Information

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

08:45 – 09:15 am: Introduction to Microirrigation (J. Ayars)

09:15 – 09:45 am: Hydrologic and Basin-scale Considerations for Microirrigation (P. Steduto)

09:45 – 10:15 am: Water Delivery Requirements for Successful Adoption of Microirrigation (E. Rothberg)

10:15 – 10:45 am: Microirrigation Systems' Components and Functions (I. Bisconer)

10:45 – 11:15 am COFFEE BREAK

Session 2 – Soil and Plant Water Dynamics in Microirrigated Cropping Systems. *Coord's: P. Steduto; K. Shackel*

11:15 – 11:45 am: Water Movements and Storage with Microirrigation in Various Soil Types (B. Sanden)

11:45 – 12:15 pm: Plant-Water Dynamics (K. Shackel)

12:15 – 12:45 pm: Soil-Plant-Atmosphere Continuum (P. Steduto)

12:45 – 1:45 pm LUNCH

Session 3 – Microirrigation Scheduling. *Coord's: D. Zaccaria; M. Cahn*

1:45 – 2:30 pm: Methods and Tools for Microirrigation Scheduling in Specialty Crops (D. Zaccaria; M. Cahn)

2:30 – 3:15 pm: Outdoor Field Session on Measuring Soil and Plant Water Status (M. Cahn; K. Shackel; C. Albuquerque)

3:15 – 3:30 pm COFFEE BREAK

Session 4 – Microirrigation for Micro-climate Control. Considerations on Sub-surface Drip Irrigation. *Coord's: K. Bali; J. Ayars*

3:30 – 4:00 pm: Irrigation for Frost Protection and Evaporative Cooling (R. Snyder)

4:00 – 4:30 pm: Energy Supply and Demand for Microirrigation (A. Aghajanzadeh)

4:30 – 5:00 pm: General Considerations on Sub-surface Drip Irrigation (J. Ayars)

5:00 – 5:30 pm: Questions & Answers

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

6:30 – 7:30 pm – Tributes to Irrigation Research Leaders (G. H. Hargreaves; J. Keller; F. Lamm; C. Phene)

<u>Day 2 (October 14, 2025)</u> - Topics: Microirrigation System Design and Operation

- ✓ Design Principles for Microirrigation Systems (D. Zaccaria)
- ✓ Hydraulics for Microirrigation Systems (O. Lagos)
- ✓ Filtration and Fertigation Systems (K. Bali; M. Culumber)
- ✓ Design and Operational Considerations for Pumps, Valves, and Flow/Pressure Control Devices (I. Bisconer)
- ✓ Microirrigation Systems Operation, Monitoring, and Maintenance (M. Cahn)
- ✓ Performance Evaluation of Microirrigation Systems and Financial Considerations (I. Bisconer)
- ✓ 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: Practical Exercise Session on Microirrigation Design and Hydraulics (O. Lagos)

10:30 – 11:00 am COFFEE BREAK

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

11:00 – 11:30 am: Filtration Systems, Operation, and Monitoring (K. Bali)

11:30 – 12:00 pm: Chemical Injection Systems, Operation, and Monitoring (M. Culumber)

12:00 – 12:30 pm: Design and Operational Considerations for Pumps, Valves, and Flow/Pressure Control Devices (I. Bisconer)

12:30 – 1:30 pm LUNCH

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

1:30 – 2:00 pm: Microirrigation System Operation, Monitoring, and Maintenance (M. Cahn)

2:00 – 2:30 pm: Criteria and Metrics for Evaluating Field Performance of Microirrigation Systems (I. Bisconer)

2:30 – 3:00 pm: A Novel Tool for Evaluating Microirrigation Performance and Financial Considerations (I. Bisconer)

3:00 – 3:30 pm COFFEE BREAK

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

3:30 – 4:00 pm: Principles of Irrigation Automation (A. Rehnvall)

4:00 – 4:30 pm: Automation and System Monitoring Components (B. Sanden)

4:30 – 5:00 pm: Irrigation Planning, Safety, Resource Conservation, and Success Stories (J. Nichols)

5:00 – 5:30 pm: Questions & Answers

5:30 pm ADJOURN

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

<u>Day 3 (October 15, 2025)</u> - Topics: Microirrigation Management for Various Crops

- ✓ Management of Microirrigation for: Field and Agronomic Crops; Vegetable Crops; Berry Crops, Fruit Crops; Nut Crops; Grape Vineyards (K. Bali; M. Cahn; A. Biscaro; A. Fulton; M. Fidelibus)
- ✓ Application of Chemical Materials (D. Amaral; Z. Wang)
- ✓ Application of Biological Effluents (G. Vivaldi)
- ✓ Salinity Management (J. Ayars; M. Culumber; E. Scudiero)

08:30 – 09:00 am: Coffee and Pastry

Session 9 – Microirrigation Management Strategies for Annual and Berry Crops. *Coord's: K. Bali; M. Cahn*

09:00 – 09:20 am Field and Agronomic Crops (K. Bali)

09:20 – 09:40 am: Vegetable Crops (M. Cahn)

09:40 – 10:00 am: Berry Crops (A. Biscaro)

10:00 – 10:30 pm: Practical Exercise Session on Microirrigation Management for Annual and Berry Crops. Questions & Answers (K. Bali; M. Cahn; A. Biscaro)

10:30 – 11:00 am COFFEE BREAK

Session 10 – Microirrigation Management Strategies for Perennial Crops. *Coord's: M. Culumber; D. Zaccaria*

11:00 – 11:30 am: Nut Crops (A. Fulton)

11:30 – 12:00 pm: Fruit Crops (To Be Defined)

12:00 – 12:30 pm: Grape Vineyards (M. Fidelibus)

12:30 – 1:30 pm LUNCH

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

1:30 – 2:00 pm: Main Criteria for Nutrient Management with Microirrigation Systems (D. Amaral)

2:00 – 2:30 pm: Application of Agrochemicals through Microirrigation Systems (Z. Wang)

2:30 – 3:00 pm: Application of Biological Effluents with Microirrigation Systems. Impacts on Plants, Soils, and Health Considerations (G. Vivaldi)

3:00 – 3:30 pm COFFEE BREAK

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

3:30 – 4:00 pm: Quantifying and Mapping Soil Salinity and Sodicity (E. Scudiero)

4:00 – 4:30 pm: Irrigation Water Quality Considerations (M. Culumber)

4:30 – 5:00 pm: Leaching and Salinity Management Practices (J. Ayars)

5:00 – 5:15 pm: Q&A Session on Salinity Management Practices (J. Ayars; M. Culumber; K. Bali)

5:15 – 5:45 pm: School Lectures Closing and Delivery of Completion Certificates (J. Ayars; M. Culumber; O. Lagos; D. Zaccaria; K. Bali; M. Cahn)

5:45 pm ADJOURN

<u>Day 4 (October 16, 2025)</u>: Field/Demonstration Visits in the San Joaquin Valley (Modernized Irrigation Water Delivery Systems; Irrigation/Fertigation Automation; Nut Crops; Fruit Crops. Coordinators: D. Zaccaria; 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: Lunch at Turlock Irrigation District Headquarter

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; M. Culumber; J. Nichols; D. Zaccaria)

4:45 pm ADJOURN

5:30 pm: Dinner at the Visalia County Club (optional);

7:00 pm: Drive to Coalinga and overnight stay at Harris Ranch – Coalinga, CA

<u>Day 5 (October 17, 2025)</u>: Field/Demonstration Visits in Salinas/Monterey Areas (Vineyards, Vegetable and Berry Crops). Coordinators: M. Cahn; L. Bettiga; C. Albuquerque

7:30 am: Departure from Harris Ranch – Coalinga, CA and drive to Soledad, CA

Visit 1 – Zabala Vineyards (Soledad, CA)

9:30 – 11:30 am CIMIS Weather Station; Measurement of Vine 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**

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) Inge Bisconer: Irrigation Consultant and Past President, Irrigation Association – San Diego, CA
5) Blake Sanden: Agronomy and Irrigation Advisor (Emeritus) - University of California Cooperative Extension Kern County
6) Kenneth Shackel: Professor, Department of Plant Sciences - University of California, Davis
7) Caetano Albuquerque: Professor, Department of Biology and Chemistry – California State University Monterey Bay
8) Daniele Zaccaria: Professor & Agricultural Water Management Specialist, LAWR Department - University of California, Davis
9) Michael Cahn: Irrigation and Water Resource Advisor – University of California Cooperative Extension Monterey County
10) Richard Snyder: Bio-meteorology Specialist (Emeritus), LAWR Department - University of California, Davis
11) Arian Aghajanzadeh: Founder of Klimate Consulting, Inc. – San Francisco, CA.
12) Octavio Lagos: Professor, School of Agricultural Engineering - University of Concepcion, Campus of Chillan (Chile)
13) Khaled Bali: Irrigation Water Management Specialist – University of California Agriculture and Natural Resources
14) Mae Culumber: Nut Crop Advisor – University of California Cooperative Extension Fresno County
15) Anders Rehnvall: CEO at EZE System Inc. - Folsom, CA
16) James Nichols: President – HotSpot Ag, Hanford, CA
17) Andre Biscaro: Irrigation Advisor – University of California Cooperative Extension Ventura County
18) Allan Fulton: Irrigation and Water Resource Advisor (Emeritus) – University of California Cooperative Extension Tehama, Glenn, Colusa, and Shasta Counties
19) Kevin Day – To Be Confirmed: Pomology Advisor, Emeritus – University of California Cooperative Extension Tulare County
20) Matthew Fidelibus: professor of Viticulture and Enology for Cooperative Extension, Department of Viticulture and Enology - University of California, Davis
21) Doug Amaral: Nut Crop Farm Advisor – University of California Cooperative Extension Kings County
22) Zheng Wang: Vegetable Crop Advisor - University of California Cooperative Extension Stanislaus County
23) Gaetano Alessandro Vivaldi: Professor - Universita' degli Studi Aldo Moro, Bari (Italy)
24) Elia Scudiero: Associate Professor, Department of Environmental Sciences – University of California, Riverside
25) James Anshutz: Founder AGH2O – Fresno, CA
26) Larry Bettiga: Viticulture Farm Advisor – University of California Cooperative Extension Monterey County