AGRICULTURAL & ENVIRONMENTAL TECHNOLOGY, BACHELOR OF SCIENCE

College of Agricultural & Environmental Sciences

The technological transformation of agriculture that began more than a century ago continues with recent advances made in sensing, data management, information processing, communications, control, modeling and simulation, gene manipulation, automation, artificial intelligence, and robotics that can radically alter resource demand and improve environmental, social and economic sustainability when appropriately implemented.

The Agricultural & Environmental Technology (AET) major aims to bridge the disciplines of agriculture, management, technology, and applied engineering, and to train students in integrating technology, leadership and design in solving complex problems in the agricultural and environmental sciences.

A key aspect of the major is to help students develop an understanding of how the next generation of technologies (including cyber#physical and knowledge#based) interact with animals, plants, and their environments, and technologies for the production and management of bio#based products and sustainable food, feed, fiber, and energy.

The Program

Learn how to integrate the next generation of technologies such as big data, robotics, digital technology, AI and machine learning for more advanced, efficient and sustainable food, fiber and energy production.

Students specialize within the major through selection of a track. Tracks are regularly reviewed and updated by program faculty to ensure relevancy to current societal needs. We offer tracks in **Digital Agriculture**, **Bioproducts and Wearable Technologies**, **Energy and Environment.** Students choose one of the three tracks, and in the **Digital Agriculture** track, they also choose an area of emphasis.

As a new major, courses are still in the process of being approved. These are notated as "Pending" in the requirements. Please contact the staff advisor for more information.

Career Alternatives

Graduates of the AET major will gain technical skills and experience in technology systems management, bio#based product innovation, environmental quality, energy efficiency, power systems, the next generation of smart agricultural machinery, GIS/GPS remote sensing and geo#informatics#based control, irrigation and water control, precision agriculture and other features of the diverse developing technologies in agriculture.

Opportunities for employment include **managers and entrepreneurs** to bridge between science, engineering and application, **skilled operators** to interface with smart machines and smart technologies, and **scholars and educators** to help train others.

Graduate study for the AET student may lead to M.S. or Ph.D. degrees in agricultural technology, data science, agriculture and life sciences, and related fields such as bioproducts, plant science, environmental science and policy, agricultural chemistry, and biochemistry.

Advising

Staff Advisor: Janette Gonzalez (https://www.bftv.ucdavis.edu/people/janette-gonzalez/)
Lead Faculty Advisor: Ali Moghimi, Ph.D. (https://bae.ucdavis.edu/people/ali-moghimi/)

The major requirements below are in addition to meeting University Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/) & College Degree Requirements (https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/); unless otherwise noted. The minimum number of units required for the Agricultural & Environmental Technology Bachelor of Science is 86.

Code	Title	Units
Preparatory Subject Matter		
Accounting		4
MGT 011A	Elementary Accounting	
Agricultural & Environmental Technology		7
TAE 010	Introduction to Agricultural & Environmental Technologies	
TAE 030	Mobile Communication & Computing Technologies for Agriculture & the Environment	
Chemistry		10
CHE 002A	General Chemistry	
CHE 002B	General Chemistry	
Communication		4
CMN 001	Introduction to Public Speaking	
or CMN 001V	Introduction to Public Speaking	
Economics		8
ECN 001A	Principles of Microeconomics	
or ECN 001AV	Principles of Microeconomics	
or ECN 001AY	Principles of Microeconomics	
ECN 001B	Principles of Macroeconomics	
or ECN 001BV	Principles of Macroeconomics	
Geology		4
GEL 001	The Earth	
Mathematics		12
MAT 017A	Calculus for Biology & Medicine	
or MAT 021A	Calculus	
MAT 017B	Calculus for Biology & Medicine	
or MAT 021B	Calculus	
MAT 017C	Calculus for Biology & Medicine	
or MAT 021C	Calculus	
Physics		6
PHY 001A	Principles of Physics	
PHY 001B	Principles of Physics	
Statistics		4
STA 013	Elementary Statistics	
or STA 013Y	Elementary Statistics	
Preparatory Subject Matter Subtotal		59
Depth Subject Matter		

Agricultural & Environmental Technology		8
TAE 100	Smart Control Systems for Agricultural & Environmental Technologies	
TAE 180	(Pending Approval)	
Management; choose 15 units:		15
ARE 100A	Intermediate Microeconomics: Theory of Production & Consumption	
ESM 121	Water Science & Management	
MGT 120	Managing & Using Information Technology	
MGT 140	Marketing for the Technology-Based Enterprise	
MGT 150	Technology Management	
Writing; choose one:		4
UWP 101	Advanced Composition	
or UWP 101V	Advanced Composition	
or UWP 101Y	Advanced Composition	
UWP 102G	Writing in the Disciplines: Environmental Writing	
UWP 104A	Writing in the Professions: Business Writing	
or UWP 104AV	Writing in the Professions: Business Writing	
or UWP 104AY	Writing in the Professions: Business Writing	
UWP 104E	Writing in the Professions: Science	
UWP 104T	Writing in the Professions: Technical Writing	
Depth Subject Matter Subtotal		27
Total Units		**86**

Tracks

Bioproducts & Wearable Technologies

Code	Title	Units
Bioproducts & Wearable Technologies		**62**
Agricultural & Environmental Technology		16
TAE 014	Introduction to Wearable Materials & Bioproducts	
TAE 130A	(Pending Approval)	
TAE 130B	(Pending Approval)	
TAE 130C	(Pending Approval)	
Chemistry		17
CHE 002C	General Chemistry	
CHE 118A	Organic Chemistry for Health & Life Sciences	
CHE 118B	Organic Chemistry for Health & Life Sciences	
CHE 118C	Organic Chemistry for Health & Life Sciences	
Design		4
DES 143	History of Fashion	
Management		4
ARE 113	Fundamentals of Marketing Management	
Social Science		9
ANT 002	Cultural Anthropology	
SOC 002	Self & Society	
or SOC 002V	Self & Society	
Restricted Electives		*12*
Choose 12 units if not previously chosen for Depth Subject Matter Requirements:		
TAE 092	Internship in Agricultural & Environmental Technology	
TAE 099	Special Study for Lower Division Students	
TAE 170A	(Pending Approval)	
TAE 170B	(Pending Approval)	
TAE 192	Internship in Agricultural & Environmental Technology	
TAE 199	Special Study for Upper Division Students (Pending Approval; May be taught abroad)	
ARE 100B	Intermediate Microeconomics: Imperfect Competition, Markets & Welfare Economics	
ARE 112	Fundamentals of Organization Management	
ARE 136	Managerial Marketing	
ARE 155	Operations Research & Management Science	
DES 040A/ SAS 043	Energy, Materials, & Design Over Time	
DES 077	Introduction to Structural Design for Fashion	
DES 127A	Sustainable Design	
DES 178	Design & Wearable Technology	
MGT 120	Managing & Using Information Technology	
MGT 140	Marketing for the Technology-Based Enterprise	
MGT 160	Financing New Business Ventures	
MGT 170	Management Accounting & Control	
MGT 180	Supply Chain Planning & Management	
Total Units		**124**

Note: For students considering graduate study in Bioproducts, the following additional preparatory subject matter is recommended; substitute PHY 007A & PHY 007B for PHY 001A & PHY 001B.

Code	Title	Units
Physical Chemistry		6
CHE 107A	Physical Chemistry for the Life Sciences	
CHE 107B	Physical Chemistry for the Life Sciences	
Physics		12
PHY 007A	General Physics	
PHY 007B	General Physics	
PHY 007C	General Physics	

Digital Agriculture

Code	Title	Units
Digital Agriculture		**62**
Agricultural & Environmental Technology		7
HYD 006	(Pending Approval)	
TAE 060	(Pending Approval)	
Biology		10

BIS 002A	Introduction to Biology: Essentials of Life on Earth	
BIS 002B	Introduction to Biology: Principles of Ecology & Evolution	
Geographic Information Systems		4
ABT/LDA 150	Introduction to Geographic Information Systems (or TAE 150 Pending Approval)	
Management; choose 4 units if not chosen previously from Depth Subject Matter Requirements:		4
ARE 112	Fundamentals of Organization Management	
ARE 113	Fundamentals of Marketing Management	
ARE 120	Agricultural Policy	
ARE 121	Economics of Agricultural Sustainability	
ARE 140	Farm Management	
MGT 120	Managing & Using Information Technology	
MGT 140	Marketing for the Technology-Based Enterprise	
MGT 150	Technology Management	
Philosophy		4
PHI 013G	Minds, Brains, & Computers with Discussion	
Science & Society; choose three units:		3
SAS 002	Feeding the World: Influences on the Global Food Supply	
or SAS 002V	Feeding the World: Influences on the Global Food Supply	
SAS 004Y	Water In Popular Culture	
or SAS 004 DISCONTINUED		
SAS/ESM 008	Water Quality at Risk	
SAS 009	Crisis in the Environment	
SAS/HYD 010	Water, Power, Society	
SAS/PLS 012	Plants & Society	
SAS 014	Forests & Society	
SAS 020	Genetics & Society	
SAS 025	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences	
or SAS 025V	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences	

Emphasis

Digital Agricultural track students must choose one of the following three emphases:

Animal Agriculture Emphasis

Code	Title	Units
Animal Agriculture Emphasis		**30**
Required Courses		*21*
Choose 3 units:		3
ANS 015	Introductory Horse Husbandry	
ANS 041	Domestic Animal Production	
ANS 041L	Domestic Animal Production Laboratory	
ANS 042	Introductory Companion Animal Biology	
Choose 5 units:		5
ANS 100	Animal Physiology	
NPB 101	Systemic Physiology	
ANS 103	Animal Welfare	4
ANS 104	Principles & Applications of Domestic Animal Behavior	4
NPB 121	Physiology of Reproduction	4
NPB 121L	Physiology of Reproduction Laboratory	1
Restricted Electives		*9*
Choose 9 units: [1]		9
TAE 092	Internship in Agricultural & Environmental Technology	
TAE 099	Special Study for Lower Division Students	
TAE 192	Internship in Agricultural & Environmental Technology	
TAE 199	Special Study for Upper Division Students (Pending Approval; May be taught abroad)	
ABT 161	Water Quality Management for Aquaculture	
ANG 107	Genetics & Animal Breeding	
ANS 115	Advanced Horse Production	
ANS 125	Equine Exercise Physiology	
ANS 126	Equine Nutrition	
ANS 141	Equine Enterprise Management	
ANS 143	Pig & Poultry Care & Management	
ANS 144	Beef Cattle & Sheep Production	
ANS 146	Dairy Cattle Production	
ANS 148	Enterprise Analysis in Animal Industries	
AVS 103	Avian Development & Genomics	
BIS 101	Genes & Gene Expression	
or BIS 101V	Genes & Gene Expression	
NUT 115	Animal Nutrition	

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Note that some ANS and ANG courses require ANS 015, ANS 041, BIS 101, BIS 101V, and/or NUT 115 as prerequisites. Students choosing these courses should take the required prerequisites as part of their required courses or restricted electives accordingly.

Plant Agriculture Emphasis

Code	Title	Units
Plant Agriculture Emphasis		**30**
Required Courses		*13*
Choose 4 units:		4
BIS 002C	Introduction to Biology: Biodiversity & the Tree of Life	
PLS 002	Botany & Physiology of Cultivated Plants	
Choose 9 or 10 units:		9-10
PLS 100A	Metabolic Processes of Cultivated Plants	
PLS 100B	Growth & Yield of Cultivated Plants	
PLS 100C	Environmental Interactions of Cultivated Plants	
OR		
BIS 101	Genes & Gene Expression	
or BIS 101V	Genes & Gene Expression	
PLB 112	Plant Growth & Development	
PLB 113	Molecular & Cellular Biology of Plants	
Restricted Electives		*17*

Choose 17 units:		17
ABT 182	Environmental Analysis Using GIS	
TAE 092	Internship in Agricultural & Environmental Technology	
TAE 099	Special Study for Lower Division Students	
TAE 192	Internship in Agricultural & Environmental Technology	
TAE 199	Special Study for Upper Division Students (Pending Approval; May be taught abroad)	
BIS 101	Genes & Gene Expression	
or BIS 101V	Genes & Gene Expression	
BIT 160	Principles of Plant Biotechnology	
BIT 161B	Plant Genetics & Biotechnology Laboratory	
ENH 125	Greenhouse & Nursery Crop Production	
ENH 150	(Discontinued)	
FST 104	Food Microbiology	
FST 109	Principles of Quality Assurance in Food Processing	
FST 131	Food Packaging	
HYD 124	Plant-Water-Soil Relationships	
PLB/PLS 102	(Discontinued)	
PLB/EVE 108	(Discontinued)	
PLB/EVE 117	Plant Ecology	
PLB/EVE 119	Population Biology of Invasive Plants & Weeds	
PLB 143	Evolution of Crop Plants	
PLB/PLP 148	Introductory Mycology	
PLP 120	Introduction to Plant Pathology	
PLP 140	(Discontinued)	
PLS 100AL	Metabolic Processes of Cultivated Plants Laboratory	
PLS 100BL	Growth & Yield of Cultivated Plants Laboratory	
PLS 100CL	Environmental Interactions of Cultivated Plants Laboratory	
PLS 101	Agriculture & the Environment	
PLS 105	Concepts in Pest Management	
PLS 110	Crop Management Systems for Vegetable Production	
PLS 112	Forage Crop Production	
PLS 113	Biological Applications in Fruit Tree Management	
PLS 114	Biological Applications in Fruit Production	
PLS 141	Ethnobotany	
PLS 147	California Plant Communities	
PLS 147L	California Plant Communities Field Study	
PLS 152	Plant Genetics	
PLS 154	Introduction to Plant Breeding	
PLS 170A	Fruit & Nut Cropping Systems	
PLS 170B	Fruit & Nut Cropping Systems	
PLS 171	Principles & Practices of Plant Propagation	
PLS 172	Biology and Quality of Harvested Crops	
PLS 173	(Discontinued)	
PLS 174	Microbiology & Safety of Fresh Fruits & Vegetables	
PLS 176	Introduction to Weed Science	
PLS 196	(Discontinued)	
SSC 100	Principles of Soil Science	

Individualized Emphasis Option

Code	Title	Units
Individualized Emphasis Option		**30**
Choose a minimum of 30 upper division units, with approval from a faculty advisor, to form a coherent program of study resulting in expertise and competence in a sub-discipline of courses in the College of Agricultural & Environmental Sciences		

Energy & Environmental Technology

Code	Title	Units
Energy & Environmental Technology		**62**
Agricultural & Environmental Technology		*20*
TAE 020	Sustainable Energy Technologies	
TAE 128	(Pending Approval)	
ABT 101	Engine Technology (or TAE 125 Pending Approval)	
ABT 121	Animal Housing & Environment Management	
or TAE 121	Controlled Environments for Plants & Animals	
ABT 212	Path to Zero Net Energy (or TAE 212 Pending Approval)	
Geographic Information Systems & Remote Sensing		*11*
ABT/LDA 150	Introduction to Geographic Information Systems (or TAE 150 Pending Approval)	
ABT 182	Environmental Analysis Using GIS (or TAE 182 Pending Approval)	
ESM 108	Environmental Monitoring	
ESM 186	Environmental Remote Sensing	
Science, Management, & Policy		*15*
Choose 15 units; if not chosen previously for Depth Subject Matter Requirements		15
ATM 116	Modern Climate Change	
ESM 120	Global Environmental Interactions	
ESP 110	Principles of Environmental Science	
ESP 167	Energy Policy	
ESP/ARE 175	Natural Resource Economics	
ECN 125	Energy Economics	
MGT 120	Managing & Using Information Technology	
MGT 140	Marketing for the Technology-Based Enterprise	
Restricted Electives		*16*
TAE 092	Internship in Agricultural & Environmental Technology	
TAE 099	Special Study for Lower Division Students	
TAE 192	Internship in Agricultural & Environmental Technology	
TAE 199	Special Study for Upper Division Students (Pending Approval; May be taught abroad)	
ATM 005	Global Climate Change	

BIS 002A	Introduction to Biology: Essentials of Life on Earth
BIS 103	Bioenergetics & Metabolism
BIS 105	Biomolecules & Metabolism
CHE 002C	General Chemistry
CHE 118A	Organic Chemistry for Health & Life Sciences
DES 127A	Sustainable Design
DES 136A	Lighting Technology & Design
DES 136B	Designing with Light–Industrial Design
DES 137A	Daylighting & Interior Design
DES 138	Materials & Methods in Interior Design
ENH 125	Greenhouse & Nursery Crop Production
ESM/SAS 008	Water Quality at Risk
ESM 100	Introduction to Water Science
ESM 121	Water Science & Management
ESM 131	Air as a Resource
ESP 001	Environmental Analysis
ESP/EVE 111	Marine Environmental Issues
ESP/GEL 116N	Oceanography
ESP/ECI 163	Energy & Environmental Aspects of Transportation
ESP 165	Climate Policy
ESP 166	Ocean & Coastal Policy
ESP 179	Environmental Impact Assessment
ETX 130	Role & Applications of Toxicology in Modern Industry
ETX 131	Environmental Toxicology of Air Pollutants
ETX 135	Health Risk Assessment of Toxicants
ETX 138	Legal Aspects of Environmental Toxicology
ETX 146	Exposure & Dose Assessment
FST 102A	Malting & Brewing Science
FST 104	Food Microbiology
FST 110	Food Processing
FST 123	Introduction to Enzymology
GEL 018	Energy & the Environment
or GEL 018V	Energy & the Environment
GEL 130	Non-Renewable Natural Resources
LDA 003	Sustainable Development: Theory & Practice
LDA 140	Green Building, Design, & Materials
MGT 160	Financing New Business Ventures
MGT 170	Management Accounting & Control
MGT 180	Supply Chain Planning & Management
PHY 010C	Physics of California
or PHY 010CY	Physics of California
PHY 112	Thermodynamics & Statistical Mechanics
PHY 129A	Introduction to Nuclear Physics
PHY 129B	Nuclear Physics, Extensions & Applications
PLS 100A	Metabolic Processes of Cultivated Plants
PLS 101	Agriculture & the Environment
PLS 162	Urban Ecology
POL 012B	Climate Change & Politics
POL 171	The Politics of Energy
SAS/PLS 012	Plants & Society
SAS 025	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences
or SAS 025V	Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences
SAS 043/ DES 040A	Energy, Materials, & Design Over Time
SOC 160	Sociology of the Environment
SSC 010	Soils in Our Environment
SSC 100	Principles of Soil Science
SSC 102	Environmental Soil Chemistry
WFC 130	Physiological Ecology of Wildlife
WFC 144	Marine Conservation Science
WFC 168	Climate Change Ecology