The ***University of Arkansas***

Dale Bumpers College of Agricultural, Food and Life Sciences

Department of Crop, Soil, and Environmental Sciences

Environmental, Soil, and Water Science
Degree Program

Undergraduate Handbook
2025-2026

6 June 2025

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Environmental, Soil, and Water Science at the University of Arkansas

Why ESWS?

Environmental challenges are everywhere—from managing carbon in our atmosphere to protecting water quality, from sustainable agriculture to ecosystem restoration. If you're interested in understanding how natural systems work and how we can manage them better, the Environmental,

Soil, and Water Science (ESWS) major in the Crop, Soil, and Environmental Sciences Department might be right for you.

What You'll Study

The ESWS program gives you a solid foundation in environmental science, soil science, and water systems. You'll start with introductory courses in each area, then dive deeper with advanced coursework tailored to your interests. Everything is built on strong fundamentals in biology, chemistry, physics, and geology.

The program is flexible—you can emphasize the areas that interest you most while still getting comprehensive coverage of environmental, soil, and water sciences. This flexibility also makes the program accessible for transfer students.

Career Paths

Our graduates work in diverse fields including:

- Environmental consulting
- Wastewater treatment and management
- Government agencies (local, state, federal)
- Private environmental companies
- Land management and restoration
- Academic and research institutions

Many students continue to graduate school for M.S. or Ph.D. degrees. Others combine their science background with interests in policy, business, or international work—one recent graduate started his career with the UN University Institute for Sustainability and Peace.

Hands-On Experience

CSES Club

Get involved through the departmental club, which tackles real environmental projects. Recent activities include:

- Wetland restoration at Bryce Davis Park
- Streambank stabilization along city trails
- School garden partnerships
- Campus composting initiatives

Club members regularly attend national conferences and have won awards at the American Society of Agronomy meetings for twelve of the last sixteen years.

Research Opportunities

Bumpers College provides research grants to students who submit successful proposals. Many students publish their work in *Discovery*, the college's undergraduate research journal. CSES students are also active in the Honors Program, completing independent research projects and writing honors theses.

Study Abroad and Internships

Students have participated in programs across the globe—from service learning in Belize to semester programs in Europe, research in Brazil, and internships in Australia. Recent faculty-led trips include sustainability studies in Belgium and cultural immersion in India.

Professional Development

Prepare for your career through professional certification programs. The department offers preparatory courses for national certification exams, including:

- Environmental Professional Intern certification through the Institute of Professional Environmental Practice
- Associate Professional Soil Scientist status through the Soil Science Society of America

Specialized Courses

Advanced courses include nutrient cycling, environmental restoration, contaminant studies, and wetland soils. In Soil Profile Descriptions, students develop field skills and can compete in regional and national soil judging competitions—our teams have been successful enough to advance to nationals multiple years running.

Program Details

The ESWS major typically enrolls 120-150 students. The department offers five minors, and students can also pursue the campus-wide Sustainability minor or other minors across the university.
CSES students receive approximately $100,000 in scholarships annually, making the program accessible to students from various backgrounds.

Get More Information

Contact Information:

- Website: http://cses.uark.edu/
- Phone: (479) 575-5740
- Location: 115 Plant Science Building

Programs Available:

- Environmental, Soil, and Water Science (major)
- Crop Science (major)
- Natural Resources Management (minor)
- Soil Science (minor)
- Crop Science (minor)
- Crop Biotechnology (minor)
- Pest Management (minor)
- Sustainability (minor): http://sustainability.uark.edu/academics/index.php

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Ready to make a real impact on environmental challenges? Explore what ESWS can offer you.

The Department of Crop, Soil, and Environmental Sciences

(Information adapted from the CSES Departmental Website)

The Department of Crop, Soil, and Environmental Sciences at the University of Arkansas has a long and honored tradition of excellence in teaching, research and service. The Department has produced a large number of successful graduates currently employed in the public and private sectors. We strive to have our best teachers in the introductory classes and to have faculty who are actively pursuing research in their respective disciplines teaching the classes related to their specialty.

Majors, Minors, and Careers

Within the Crop, Soil, and Environmental Sciences Department students can major in two degree programs, **Environmental, Soil, and Water Science** and **Crop Science**. The degree check sheet for the **Environmental, Soil, and Water Science** major is given on page 8. The major provides students with basic and applied courses that allow our graduates to be highly competitive in the job market.

The Environmental, Soil, and Water Science Major

Why is Environmental, Soil, and Water Science important?

- Awareness of environmental issues
- Increasing world population
- Public demands for clean air and water, and a healthy food supply
- Conservation of natural resources

Who should be interested?

The Environmental, Soil, and Water major is for students interested in issues such as water quality, proper use of soils, land application of wastes, proper use of fertilizers, fate of pesticides in soil and water, remediation of contaminated soils and waters, and wetlands. The major provides a strong science background, as well as a practical education.

Career Opportunities

Students who graduate in Environmental, Soil, and Water Science can work in such areas as:

Local, State, or Federal Governmental Agencies

- Arkansas Soil and Water Conservation Commission
- Arkansas Department of Environmental Quality
- Arkansas Department of Health
- Cooperative Extension Service
- Environmental Protection Agency (EPA)
- United State Department of Agriculture (USDA)
- Natural Resource Conservation Service (NRCS)
- Forest Service (FS)

- Fish and Wildlife Service

  Private Sector
- Environmental consulting
- Land-use planning
- Waste management
- Industry

  Academia/Research
- Many students go on to Graduate School to further their education
- Research Technician

Certification Possibilities - Coursework prepares students to take the Certified Professional Soil Science exam or the Environmental Professional Intern certification exam. Preparation courses for the certification exams are offered as ENSC 4401 Professional Certification Preparation (SP).

Minor Fields for Environmental, Soil, and Water Science Majors

Students majoring in Environmental, Soil, and Water Science are encouraged to select a minor in an area of interest utilizing elective hours. Minors offered by the CSES Department are **Natural Resources Management, Soil Science, Crop Biotechnology, Crop Science,** and **Pest Management**. Check sheets for these CSES minors are given starting on page 9. *If a minor is selected, students must declare the minor in the AFLS Dean's Office (AFLS E-202) to have it officially entered into the UAConnect system.*

Bumpers College Minors. Twenty-four minors are offered by the Bumpers College. In addition to the minors offered in the CSES Department, other options include: Agribusiness; Agricultural Communication; Agricultural Education; Agricultural Leadership; Agricultural Systems Technology Management; Animal Science; Entomology; Equine Science; Event Management; Food Science; Horticulture; Hospitality; Human Development and Family Sciences; Human Nutrition; International Economic Development; Landscape Horticulture; Plant Pathology; Poultry Science; and Turf Management.

Fulbright College Minors. Forty-eight minors are offered by the Fulbright College including: Biology, Chemistry, Geology, Communication, foreign languages, and Geography.

Walton College Minors. The Walton College offers a Business Administration Minor for non-business students. Twelve minor concentrations are offered for non-business majors: General Business, Accounting, Business Economics, Enterprise Resource Planning, Enterprise Systems, Finance, Information Systems, International Business, Management, Marketing, Retail, and Supply Chain Management.

University Minor. A campus-wide minor in Sustainability is available.

Advising Responsibilities

In the Bumpers College and in the Department of Crop, Soil, and Environmental Sciences at the University of Arkansas we are committed to strong, effective advising. Effective advising is a partnership between the student and the faculty advisor. Each person has responsibilities.

Advisor Responsibilities	Student Responsibilities
know degree requirements	be responsible for self
know resources & services to direct students	be familiar with deadlines
understand sequence of courses	know degree plan requirements
provide guidance & advice	use your University of Arkansas email
	use available resources
	communicate with advisor & instructors to develop positive relationships

UA Advising Goals

"Academic advising is an active, ongoing partnership between the advisors and students grounded in teaching and learning. Advising is based on students gaining accurate and appropriate information and direction to help make their educational experience relevant, coherent, and meaningful. It is a process that assists students in connecting with the University of Arkansas, making thoughtful decisions related to their academic experiences, and maximizing their education and career opportunities. Quality academic advising is essential to achieving the University's vision." (AFLS Academic Advising Syllabus)

For more information about advising in Bumper's College, see https://bumperscollege.uark.edu/current-students/advising.php.

DEPARTMENT OF CROP, SOIL, AND ENVIRONMENTAL SCIENCES

Major in Environmental Soil and Water Science

Check Sheet for Environmental Soil and Water Science (ESWS) Major

2023-2024

Name: I.D. Number: Advisor:

University Requirements: 1 hour[2]

☐ UNIV 1001 University Perspectives

Communications:12 hours

☐ ENGL 1013 Composition I

☐ ENGL 1023 Composition II

☐ COMM 1313 Public Speaking

☐ ACOM 3143 Communicating Agriculture to the Public **OR** ☐ CSES 3023 Crop, Soil and Environmental Sciences Colloquium

US History or Government: 3 hours

☐ HIST 2003 **or** HIST 2013 **or** PLSC 2003

Mathematics: 6 hours

☐ MATH 1203 College Algebra ☐ MATH 1213 Plane Trigonometry[3]

Physical and Biological Sciences: 35 hours

☐ BIOL 1543 Principles of Biology

☐ BIOL 1541L Principles of Biology Lab

☐ BIOL 2013 General Microbiology

☐ BIOL 2011L General Microbiology Lab

☐ BIOL 3863 General Ecology

☐ BIOL 3861L General Ecology Lab **OR**

☐ ENSC 3223 Ecosystems Assessment

☐ ENSC 3221L Ecosystems Assessment Lab

☐ CSES 1203 Intro to Plant Sciences

☐ CHEM 1103 University Chemistry I

☐ CHEM 1101L University Chemistry I Lab

☐ CHEM 1123 University Chemistry II

☐ CHEM 1121L University Chemistry II Lab

☐ CHEM 2613 Organic Physiological Chemistry

☐ CHEM 2611L Organic Physiological Chemistry Lab **OR**

☐ CHEM 3603 Organic Chemistry I

☐ CHEM 3601L Organic Chemistry I Lab

☐ GEOS 1113 Physical Geology

☐ GEOS 1111L Physical Geology Lab

☐ PHYS 2013 College Physics I

☐ PHYS 2011L College Physics I Lab

Fine Arts/Humanities: 6 hours

Choose 3 hours from Fine Arts and 3 hours from Humanities:[2]

Check for Completion	Course ID	Course Name
☐		
☐		

Social Sciences: 9 hours

Choose 9 hours from Social Science Core:[2]

Check for Completion	Course ID	Course Name
☐		
☐		
☐		

ESWS Major Core: 32-33 hours[5]

Environmental Science Core (17 hours):

☐ CSES 2203 Soil Science

☐ CSES 2201L Soil Science Lab

☐ ENSC 1003 Environmental Science

☐ ENSC 1001L Environmental Science Lab

☐ ASTM 2903 AHES Applications of Microcomputers

☐ ENSC 3003 Introduction to Water Science

☐ STAT 2303 Principles of Statistics

Soil Science core (3-4 hours): Choose at least 3 hours from the following:

☐ CSES 3214 Soil Resources and Nutrient Cycles

☐ CSES 4224 Soil Fertility

☐ CSES 4253 Soil Classification and Genesis

☐ CSES 4553 Wetland Soils

☐ ENSC 3263 Soil & Water Conservation

☐ ENSC 4263 Environmental Soil Science

Water Science core (3 hours): Choose 3 hours from the following:

☐ ENSC 4023 Water Quality

☐ GEOS 3333 Oceanography

☐ GEOS 4033 Hydrogeology

☐ GEOS 4363 Climatology

☐ GEOS 4473 Applied Climatology

Natural Resources Core: Environmental Science – Choose 6-9 hours from the following[6]:

☐ ASTM 3153 Surveying in Agriculture and Forestry

☐ CSES 2013 Pest Management

☐ CSES 355V Soil Profile Description (1 hour)[4]

☐ CSES 4553 Wetland Soils

☐ CSES 462V Internship (1-6 hours)

☐ ENSC 3103 Plants and Environmental Restoration

☐ ENSC 3263 Soil and Water Conservation

☐ ENSC 3603 GIS for Environmental Science

☐ ENSC 4021L Water Quality Lab

☐ ENSC 4401 Professional Certification Preparation

☐ GEOS 3043 Sustaining Earth

☐ GEOS 3543 Geospatial Applications and Information Science

Environmental Studies – Choose 0-3 hours from the following

☐ AGEC 3413 Principles of Environmental Economics

☐ AGEC 3503 Agricultural Law I

☐ AGEC 3523 Environmental and Natural Resource Law

☐ ENSC 3933 Environmental Ethics

☐SOCI 4603 Environmental Sociology

General Electives: 16-17 hours

Check for Completion	Course ID:	Course Name:
☐		
☐		
☐		
☐		
☐		
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☐		

OTHER REQUIREMENTS FOR A B.S.A. DEGREE

120 total semester hours of which:
9 hrs outside the Departmental Alpha Codes within the Bumpers College
Courses taken within major cannot be taken for duplicate credit
2.00 GPA

[1]UNIV 1001 is required for new freshmen or transfer with less than 24 hours
[2]See student degree audit for approved course list
[3]Higher level MATH is encouraged for students with ACT>26 and considering graduate school
[4]May take twice for two hours total credit.
[5]Courses taken within major cannot be taken for duplicate credit.
[6]One 3-hr study abroad course, either Experiential Learning in Indian Agriculture (Jan) or Sustainability in the Eurozone Agro-Food Chain (May), which are both taken under AFLS 401V/401VH, can be substituted for 3 hours of Natural Resources core.

Dale Bumpers College of Agricultural, Food and Life Sciences

NATURAL RESOURCES MANAGEMENT MINOR (NRMT-M)
2023-2024

Name: **I.D. Number:**

The Natural Resources Management minor will consist of 18 hours[1] to include the following:

Core Requirements:
☐ ENSC 1003 Environmental Science
☐ ENSC 1001L Environmental Science Laboratory
☐ CSES 2203 Soil Science **OR**
☐ ENSC 3003 Introduction to Water Science

Select eleven (11) hours[2] from the following:
☐ AGEC 3413 Principles of Environmental Economics
☐ AGEC 3503 Agricultural Law I
☐ AGEC 3523 Environmental and Natural Resources Law
☐ BIOL 3863 General Ecology **AND**
☐ BIOL 3861L General Ecology Laboratory
☐ CSES 1203 Introduction to Plant Sciences
☐ CSES 2013 Pest Management
☐ CSES 2201L Soil Science Laboratory
☐ CSES 3214 Soil Resources and Nutrient Cycles
☐ CSES 355V Soil Profile Description
☐ CSES 4013 Advanced Crop Science
☐ CSES 4133 Ecology and Morphology of Weedy and Invasive Plants
☐ CSES 4224 Soil Fertility
☐ CSES 4253 Soil Classification and Genesis
☐ CSES 4553 Wetland Soils
☐ CSES 462V Internship
☐ ENSC 3103 Plants and Environmental Restoration
☐ ENSC 3223 Ecosystems Assessment **AND**
☐ ENSC 3221L Ecosystems Assessment Laboratory
☐ ENSC 3263 Soil and Water Conservation
☐ ENSC 3603 GIS for Environmental Science
☐ ENSC 4021L Water Quality Laboratory
☐ ENSC 4023 Water Quality
☐ ENSC 4263 Environmental Soil Science
☐ ENSC 4401 Professional Certification Preparation
☐ GEOS 3043 Sustaining Earth
☐ GEOS 3543 Geospatial Applications and Information Science

Bumpers College students who wish to pursue this minor should complete the major/minor change form at https://forms.uark.edu/xfp/form/484. Students pursuing a major outside of Bumpers College should contact their college's dean's office to request the minor to be added. If you have questions, contact Bumpers College Student Services at 479-575-2252 or aflsdean@uark.edu.

[1]*No more than nine (9) hours can be counted toward the Natural Resources Management minor for students majoring in Environmental Soil and Water Science.*
[2]*A minimum of eight (8) hours must be 3000 or 4000 level courses.*

University of Arkansas
Dale Bumpers College of Agricultural, Food and Life Sciences

SOIL SCIENCE MINOR (SOIL-M)
2023-2024

Name: **I.D. Number:**

The Soil Science[1] minor will consist of 18 hours[2] to include the following:

Core Requirements:

☐ CSES 2203 Soil Science
☐ CSES 2201L Soil Science Laboratory

Select fourteen (14) hours from the following:

Undergraduate Courses

☐ CSES 3214 Soil Resources and Nutrient Cycles
☐ CSES 355V Soil Profile Description (1 hour – may be taken for up to 2 hours)
☐ CSES 4224 Soil Fertility
☐ CSES 4253 Soil Classification and Genesis
☐ CSES 4553 Wetland Soils
☐ ENSC 3263 Soil and Water Conservation
☐ ENSC 4263 Environmental Soil Science
☐ ENSC 4401 Professional Certification Preparation (soils exam)

Graduate Courses

☐ CSES 5033 Advanced Soil Fertility and Plant Nutrition
☐ CSES 5224 Soil Physics
☐ CSES 5264 Microbial Ecology
☐ CSES 5453 Soil Chemistry

Bumpers College students who wish to pursue this minor should complete the major/minor change form at https://forms.uark.edu/xfp/form/484. Students pursuing a major outside of Bumpers College should contact their college's dean's office to request the minor to be added. If you have questions, contact Bumpers College Student Services at 479-575-2252 or aflsdean@uark.edu.

Students interested in obtaining certification in the soil science discipline will need at least 15 hours in soil science, preferably in each of the sub-disciplines (i.e., fertility, genesis, morphology and classification, chemistry, physics, soil biology, and land use and management.

[1]*No more than nine (9) hours can be counted toward the Soil Science minor for students majoring in Environmental Soil and Water Science.*

University of Arkansas
Dale Bumpers College of Agricultural, Food and Life Sciences

CROP SCIENCE MINOR (CPSC-M)
2023-2024

Name: **I.D. Number:**

The Crop Science minor will consist of 18 hours to include the following:

Core Requirements:
☐ CSES 2103 Crop Science
☐ CSES 2203 Soil Science

Select twelve (12) hours from the following:

Group A – must choose at least four (4) hours:
☐ CSES 3312 Cotton Production
☐ CSES 3322 Soybean Production
☐ CSES 3332 Rice Production
☐ CSES 3342 Cereal Grain Production

Group B:

☐ CSES 3214 Soil Resources and Nutrient Cycles
☐ CSES 4013 Advanced Crop Science
☐ CSES 4103 Plant Breeding
☐ CSES 4133 Ecology and Morphology of Weedy and Invasive Plants
☐ CSES 4143 Principles of Weed Control
☐ CSES 4224 Soil Fertility

Bumpers College students who wish to pursue this minor should complete the major/minor change form at https://forms.uark.edu/xfp/form/484. Students pursuing a major outside of Bumpers College should contact their college's dean's office to request the minor to be added. If you have questions, contact Bumpers College Student Services at 479-575-2252 or aflsdean@uark.edu.

University of Arkansas
Dale Bumpers College of Agricultural, Food and Life Sciences

CROP BIOTECHNOLOGY MINOR (CPBT-M)
2023-2024

Name: **I.D. Number:**

The Crop Biotechnology minor will consist of 16 hours to include the

Core Requirements:
☐ PLPA 4333 Biotechnology in Agriculture

Genetics:
☐ CSES 400V Special Problem (2 hours) [1]
☐ CSES 400V Special Problem (2 hours) [1]

Select three hours from the following:
☐ BIOL 2323 General Genetics
☐ ANSC or POSC 3123 Principles of Genetics

Select six (6) hours from the following Controlled Electives:
☐ BIOL 4303 Plant Physiology
☐ CHEM 3813 Elements of Biochemistry
☐ CSES 4103 Plant Breeding

Bumpers College students who wish to pursue this minor should complete the major/minor change form at https://forms.uark.edu/xfp/form/484. Students pursuing a major outside of Bumpers College should contact their college's dean's office to request the minor to be added. If you have questions, contact Bumpers College Student Services at 479-575-2252 or aflsdean@uark.edu.

[1] Two-hour special problems courses must be completed in two different semesters.

University of Arkansas
Dale Bumpers College of Agricultural, Food and Life Sciences

PEST MANAGEMENT MINOR (PMGT-M)
2023-2024

Name: **I.D. Number:**

The Pest Management minor will consist of 19-20 hours[1] to include the following:

Core Requirements:

☐ ENTO 3013 Introduction to Entomology
☐ PLPA 3003 Principles of Plant Pathology
☐ PLPA 3001L Principles of Plant Pathology Laboratory

Select a minimum of twelve (12) hours from the following:

☐ CSES 4133 Ecology and Morphology of Weedy and Invasive Plants
☐ CSES 4143 Principles of Weed Control
☐ ENTO 4123 Insect Pest Management
☐ ENTO 4133 Advanced Applied Entomology
☐ PLPA 4223 Plant Disease Control

Bumpers College students who wish to pursue this minor should complete the major/minor change form at https://forms.uark.edu/xfp/form/484. Students pursuing a major outside of Bumpers College should contact their college's dean's office to request the minor to be added. If you have questions, contact Bumpers College Student Services at 479-575-2252 or aflsdean@uark.edu.

[1]*Students completing the Pest Management minor are required to complete two courses from the following three disciplines: ENTO, PLPA and CSES.*

University of Arkansas
University Wide Sustainability Minor
(18 Credits)
2023-2024

Name: I.D. Number:

NOTE: When declaring this minor, please review the Sustainability Minor Website (sustainability.uark.edu/academics/minor) and fill out the declaration form. Return form to Rachel Fletcher (rachelf@uark.edu) and Ken McCown (kennethm@uark.edu).

NOTE: The different sections (i.e. "Natural Systems", "Managed Systems", etc.) are different possible focuses. Electives may be chosen from any of these focuses, so long as the tiers are correct for the requirements.

Required Courses (9 Credits)

SUST 1103 Foundations of Sustainability
SUST 2103 Applications of Sustainability
SUST 4103 Capstone in Sustainability

Required Elective Courses (9 Credits)

TIER 1 Elective _____
TIER 1 Elective _____
TIER 1 or TIER 2 Elective _____

NATURAL SYSTEMS

Tier 1 (use 1 to 3)

BENG 4933 Sustainable Watershed Engineering (Fa)
BIOL 3861L General Ecology Laboratory (Fa)
BIOL 4154 General Ecology (Sp, Fa)
BIOL 4174 Conservation Genetics (Sp)
CHEM 3214 Energy Conversion and Storage (Even years, Fa)
CSES 3214 Soil Resources and Nutrient Cycles (Odd years, Sp)
ENSC 3003 Introduction to Water Science (Sp)
ENSC 3103 Plants and Environmental Restoration (Odd years, Fa)
ENSC 3223 Ecosystems Assessment (Even years, Fa)
ENSC 3263 Environmental Soil and Water Conservation (Even years, Fa)
ENSC 4023 Water Quality (Fa)
ENSC 4263 Environmental Soil Science (Even years, Sp)
GEOS 3043 Sustaining Earth (Sp, Su, Fa)
GEOS 4933 Ancient Forests: Science and Sustainability (Sp)

Tier 2 (use 1)

BIOL 1543 Principles of Biology (ACTS Equivalency = BIOL 1014 Lect.) (Sp, Su, Fa)

CHEM 1103 University Chemistry I (Su, Fa)
CHEM 1123 University Chemistry II (ACTS Equivalency = CHEM 1004 Lect.) (Sp, Su, Fa)
CHEM 3603 Organic Chemistry I (Su, Fa)
CHEM 3703 Organic Chemistry I for Majors (Fa)
CSES 2201L Soil Science Laboratory (Fa)
CSES 2203 Soil Science (Fa)
ENSC 1003 Environmental Science (Fa)
GEOS 1111L General Geology Laboratory (ACTS Equivalency = GEOL 1114 Lab) (Sp, Su, Fa)
GEOS 1131L Environmental Geology Laboratory (ACTS Equivalency = GEOL 1124 Lab) (Sp.)
GEOS 1133 Earth Science (ACTS Equivalency = GEOL 1124 Lect.) (Sp)
GEOS 2003 World Regional Geography (ACTS Equivalency = GEOG 2103) (Sp, Fa)
GEOS 3333 Oceanography (Even years, Sp)
GEOS 3383 Principles of Landscape Evolution (Fa)
GEOS 4033 Hydrogeology (Sp)
GEOS 4053 Geomorphology (Sp)
GEOS 4063 Principles of Geochemistry (Fa)
GEOS 4353 Meteorology (Fa)
GEOS 4363 Climatology (Sp)
GEOS 4413 Principles of Remote Sensing (Fa)
MATH 4163 Dynamic Models in Biology (Irregular)
PHYS 2054 University Physics I (ACTS Equivalency = PHYS 2034) (Sp, Su, Fa)
PHYS 2074 University Physics II (ACTS Equivalency = PHYS 2044 Lect) (Sp, Su, Fa)

MANAGED SYSTEMS

Tier 1 (use 1 to 3)

AGEC 3413 Principles of Environmental Economics (Sp)
AGEC 3413H Honors Principles of Environmental Economics (Sp)
AGEC 3523 Environmental and Natural Resources Law (Even years, Sp)
AGED 4003 Issues in Agriculture (Fa)
AGED 4443 Principles of Technological Change (Odd years, Fa)
AMPD 3023 Sustainability in the Apparel and Textile Industry (Fa)
BENG 3603 Metrics for Sustainable Agricultural Systems (Fa)
CSES 3214 Soil Resources and Nutrient Cycles (Odd years, Sp)
ECON 3843 Economic Development, Poverty, and the Role of the World Bank and IMF in Low-Income Countries (Fa)
ENSC 3103 Plants and Environmental Restoration (Odd years, Fa)
ENSC 3223 Ecosystems Assessment (Even years, Fa)
ENSC 3263 Environmental Soil and Water Conservation (Even years, Fa)
ENSC 404V Soils and Civilization (Irregular)
ENSC 4023 Water Quality (Fa)
ENSC 4263 Environmental Soil Science (Even years, Sp)
HORT 3503 Sustainable and Organic Horticulture (Even years, Fa)
MGMT 4243 Ethics and Corporate Responsibility (Sp, Fa)

SCMT 4123 Sustainable Logistics and Supply Chain Management (Irregular)
SCMT 4853 Cross-Sector Collaboration for Sustainability (Sp)
WCOB 3023 Sustainability in Business (Irregular)

Tier 2 (use 1)
AGME 1613 Fundamentals of Agricultural Systems Technology (Fa)
CSES 2012 Introduction to Organic Crop Production (Odd years, Sp)
CSES 2201L Soil Science Laboratory (Fa)
CSES 2203 Soil Science (Fa)
ENSC 1003 Environmental Science (Fa)

BUILT SYSTEMS
Tier 1 (use 1 to 3)
BENG 3653 Global Bio-Energy Engineering (Fa)
BENG 4663 Sustainable Biosystems Designs (Sp)
CVEG 3243 Environmental Engineering (Sp, Fa)
CVEG 4243 Environmental Engineering Design (Sp, Fa)
CVEG 4863 Sustainability in Civil Engineering (Irregular)
GEOS 4383 Hazard and Disaster Assessment, Mitigation, Risk and Policy (Sp)
LARC 4753 Incremental Sprawl Repair (Irregular)
LARC 5043 Housing as if the Future Matters (Irregular)
LARC 5493 Environmental Land Use Planning (Sp)
MEEG 4453 Industrial Waste and Energy Management (Irregular)
MEEG 4473 Indoor Environmental Design (Irregular

Tier 2 (use 1)
ARCH 2113 Architectural Structures I (Fa)
ARCH 2132 Environmental Technology I (Fa)
ARCH 3143 Building Materials and Assemblies (Fa)
ARCH 4152 Building Systems Integration (Sp, Fa)
CSCE 4233 Low Power Digital Systems (Irregular)
CVEG 4323 Design of Structural Systems (Sp)
GEOS 4073 Urban Geography (Sp)
GEOS 3543 Geospatial Applications and Information Science (Fa)
IARD 2823 Interior Design Materials and Assemblies (Fa)
IARD 3833 Interior Building Systems (Fa)
LARC 4743 Public Participation in Design and Planning (Irregular)
TEED 2103 Technology and Society (Fa)

SOCIAL SYSTEMS
Tier 1 (use 1 to 3)
AGEC 3523 Environmental and Natural Resources Law (Even years, Sp)

AGEC 4163	Agricultural and Rural Development (Fa)
ANTH 4143	Ecological Anthropology (Irregular)
CHLP 4553	Environmental Health (Sp)
COMM 4643	Environmental Communication (Irregular)
ENGL 4133	Writing Nature (Sp)
ENSC 3933	Environmental Ethics (Odd years, Sp)
PHIL 3133	Environmental Ethics (Odd years, Sp) (crosslisted with ENSC 3933)
GDES 4363	Design for Complexity (Odd years, Sp)
GEOS 4693	Environmental Justice (Sp)
GEOS 4693H	Honors Environmental Justice (Sp)
HIST 4473	Environmental History (Irregular)
RESM 1023	Recreation and Natural Resources (Sp, Su, Fa)
RESM 4023	Outdoor Adventure Leadership (Su)
ROSC 4603	Environmental Sociology (Sp)

Tier 2 (use 1)

CHLP 4643	Multicultural Health (Sp)
GDES 4353	Human-Centered Design (Fa)
HIST 3273	Agricultural and Rural History of the United States (Irregular)
HIST 3323	The West of the Imagination (Irregular)
HIST 4463	The American Frontier (Odd years, Fa)
SCWK 31903	Human Diversity and Social Work (Sp, Su, Fa)
SCWK 4093	Human Behavior and the Social Environment I (Sp, Fa)
SCWK 4103	Human Behavior and the Social Environment II (Sp, Fa
SOCI 2033	Social Problems (ACTS Equivalency = SOCI 2013) (Sp, Su, Fa)
SOCI 3303	Social Data and Analysis (Sp, Fa)

Students must earn a grade of 'C' or better for all courses to fulfill the requirements of the Minor. Students may take courses from any systems area and from any combination of areas. ***Tier 1*** courses focus upon content directly applicable to sustainability. ***Tier 2*** courses provide foundational knowledge needed to understand sustainability principles.

Degree Requirements

(Information adapted from the University of Arkansas Catalog of Studies website)

University Graduation Requirements

- 120 semester hours of credit
- 35 hours University Core Courses. See check sheet for specific courses required.
- 2.00 GPA ("C" average) on all work attempted at the University of Arkansas.
- ≤68 semester hours of lower-division transfer course work (1000/2000 level).

Bumpers College Graduation Requirements

(Advising forms available at: https://bumperscollege.uark.edu/current-students/advising.php)

- 9 hours of Broadening electives (Bumpers College courses taken outside of ENSC).
- 36 hours of upper division course work (3000 level or above).
- 6 hours of Communications (COMM 1313 and CSES 3023 or AGED 3143).
- In addition to university and college requirements students must meet other defined departmental requirements specific to each major and concentration. Bumpers College courses outside of the major may be included in departmental requirements.
- Residency - All students must have a minimum residence requirement of 36 weeks and 30 semester hours. The senior year must be completed in residence on campus unless a senior has already met the minimum residency requirement. This student will be permitted to earn not more than 12 of the last 30 hours in extension or correspondence courses or in residence at another accredited institution granting the baccalaureate degree. No more than six of these 12 hours may be correspondence courses.

Rules Applying to Course Work Used for Degree Credit •

No credit will be given for duplicate coursework.

- A maximum of 6 hours of internship and 6 hours of special problems may be counted for degree credit.
- General electives may be used to meet the requirements for a minor.
- A total of 6 hours of elective credits in activity courses (PE, band, chorus, judging teams, debate, drama, athletics, etc.) may be counted toward a degree. The maximum elective credits in any one activity that may be counted toward a degree are as follows:

Band and/or chorus	4 hours
Drama and/or debate	4 hours
Judging teams	4 hours
Physical education activities	4 hours

- Any course taken by correspondence, including Web-based courses, must be approved in advance in the AFLS dean's office if the credits earned in the course are to be applied toward a degree. This rule applies regardless of the school from which the course is taken.
- All transfer course work to be applied toward the degree must be an approved course listed in the transfer equivalency guide maintained by the Registrar's office. For courses not listed in the guide, petitions can be submitted to the Dean's office by the student's academic adviser.

- All study abroad courses must be approved in advance in the Dean's office if the credits earned in the courses are to be applied toward a degree.

Requirements to Graduate with Honors Designation and/or Honors Distinction

Honors Designation

Students who have demonstrated exceptional academic performance in baccalaureate degree programs will be recognized at graduation by the honors designation of *Cum Laude, Magna Cum Laude*, or *Summa Cum Laude*. To earn these, a student must meet the following criteria:

- At least one-half of the degree course work must have been completed at the University of Arkansas, Fayetteville.
- Only the grade-point average on course work completed at the University of Arkansas, Fayetteville, will be considered.
- Must successfully complete the Bumpers College Honors Program, which includes a minimum of 9-12 hours of honors course work, 3-6 hours of honors thesis, and a completed honors capstone research or creative project culminating in a written thesis documenting the project.
- For each of the three honors designations, the student must have the minimum gradepoint average indicated. *Cum Laude*: 3.50 to 3.74

  Magna Cum Laude: 3.75 to 3.89 *Summa Cum Laude*: 3.90 to 4.00

  • Students who do not participate in the AFLS Honors Program but earn the above grade-point averages will graduate "with distinction", "with high distinction", and

  "with highest distinction", respectively.

The AFLS Honors Program

Mission Statement – The mission of the AFLS Honors Program is to provide undergraduate students with opportunities beyond the traditional undergraduate experience.

- Students who enter the University with a High School GPA of 3.5 and an ACT of 28 or who transfer in with a cumulative college GPA of 3.5 (< 62 credit hrs) are eligible to join the AFLS Honors Program and graduate with Honors Designation.

Benefits of the AFLS Honors Program

- Enhance opportunities for admission to graduate and professional schools
- Opportunity to work directly with faculty mentors on their research/creative projects culminating in their honors thesis
- Specialized honors courses
- Opportunity to receive stipends to support thesis projects and study abroad opportunities
- Opportunities to publish results and present findings at scientific or professional meetings
- Advanced course pre-enrollment
- Opportunity for special housing in the Honors Quarters
- Special recognition at the College commencement ceremony

For additional information and to apply for admission to the program visit the AFLS Honors Program website (https://bumpershonors.uark.edu).

AFLS Grading System

The Dale Bumpers College of Agricultural, Food and Life Sciences utilizes a plus/minus grading system that assigns numerical values to 12 different grades. These values are used for courses when grade-point averages are calculated. See Grades and Marks for the method of calculating grade-point averages. The 12-step grading system with assigned values is as follows:

	A 4.00	A-.....3.67
B+.....3.33	B 3.00	B-.....2.67
C+.....2.33	C 2.00	C-.....1.67
D+.....1.33	D 1.00	D-.....0.67
	F 0.00	

Resources Available

There are many resources on campus available to assist students in overcoming personal obstacles and achieving success while at the University of Arkansas. While the goal is for students to take control of their college experience, departmental, college, and university personnel are here to provide guidance, offer advice, ask questions, make suggestions and recommendations, provide referrals, and above all, inform students of the many opportunities available to them. Students are encouraged to ask advisors about university resources and how to find them. Academic advisor contact information should be available in your Student Center in UA Connect. Students will also learn about many of those resources in their freshmen orientation course, UNIV 1001 University Perspectives.

If you would rather speak to someone outside the department, feel free to contact Vicky Watkins, Retention and Curriculum Coordinator, in the Bumpers College Dean's Office at 479-575-2121, email watkinsv@uark.edu, or schedule an appointment with Ms. Watkins in UA Success.

University academic support resources are consolidated under the Center for Learning and Student Success (**CLASS+**) +Tutoring, +Writing Support, +Supplemental Instruction, +Academic Coaching, located at class.uark.edu, 479-575-2885, or you can visit the office in

lower level of Gregson Hall. The entrance to the CLASS+ office is on the south side of Gregson Hall, down the stairs behind the UA bus stop.

In addition, students can also receive assistance by contacting **CAPs** (Counseling and Psychological Services) at Pat Walker Health Center on the corner of Maple and Garland. Schedule an appointment by calling 479-575-5276. For additional information, visit the CAPs website at: http://health.uark.edu/counseling/index.php.

The Division of Student Affairs will also connect students to appropriate resources to overcome personal and education barriers. Find out more and/or for a referral, please visit https://uofacares.uark.edu/.

Scholarships for Department of Crop, Soil, and Environmental Sciences

Scholarships available to CSES students are made possible by generous gifts from many firms and individuals. The criteria for these scholarships include academics, majors and minors, interests, financial need, and extracurricular activities. The Bumpers Scholarship Application (which is also the University of Arkansas universal application for current students) makes one eligible for many of these scholarships. There are some scholarships that require additional applications; these are listed under Special Applications. For many academic years, approximately $100,000 has been awarded to deserving undergraduates. For additional information contact Dr. Kristofor Brye, CSES Scholarship Coordinator (kbrye@uark.edu; 479-575-5742). A link to the scholarship application that is due each year will be available through the college's scholarship webpage https://bumperscollege.uark.edu/future-students/scholarships.php.
Check the college web site for application due date (usually beginning of February).

The updated list of scholarships is available at the college webpage at https://bumperscollege.uark.edu/future-students/scholarships.php

Other Scholarships to Consider Applying for

American Society of Agronomy - Several scholarships available to a variety of recipients. Information is available at: https://www.agronomy.org/students/

Arkansas Alumni Association - Several scholarships available to a variety of recipients. Information is available at: http://arkalum.org/scholarships/

Arkansas Association of Professional Soil Classifiers - Deadline is usually October/November. http://www.accessarkansas.org/soilclassifiers/index.htm

Arkansas Academic Challenge Scholarship - Scholarship information is available at http://www.adhe.edu

Arkansas Farm Bureau Scholarship - Jr or Sr; Arkansas resident; enrolled in an Arkansas accredited college or university; actively pursuing an ag-related degree. Scholarship based upon academic achievement, character, career plans, financial need and leadership potential. Must maintain a 2.5 GPA. Information is available at: http://www.arfb.com/programs/scholarship.asp

Arkansas Game and Fish Commission - Arkansas high school Sr or Arkansas college undergraduate pursuing a career in the field of natural resources conservation with a 2.5 cumulative GPA (4.0 scale). Applicants must not have received a full scholarship from another source. Information is available at: http://www.agfc.com/educationclass/programs/conservation-scholarship-program.aspx

Arkansas Society of Professional Sanitarians - So; Arkansas resident; enrolled in an environmental field. Deadline usually in March or April. Information is available at: http://www.arkansassanitarians.org/scholarship.php

Arkansas Environmental Federation Randall Mathis Scholarship for Environmental Studies and Larry Wilson Scholarship for Environmental Studies - Deadline is usually January. Information is available at: http://www.environmentark.org/scholarships.html

Garden Club of America - Numerous scholarships available with deadlines ranging from November through February. Information is available at: http://gcamerica.org/scholarships.php3

Mark and Theresa Gentry Land and Water Scholarship - Undergraduate and graduate students of the University of Arkansas, Fayetteville, who are studying land and water resources management, or related areas. Application forms are available at the Arkansas Water Resources Center, 112 Ozark Hall, University of Arkansas, Fayetteville, Arkansas, 72701, (479) 575-5867, by e-mailing awrc@uark.edu. Deadline is typically February. Information is available at: http://www.uark.edu/depts/awrc/scholarships.html

Razorback Chapter Soil and Water Conservation Scholarship (NRCS) - Contact: brent.clark@ar.usda.gov

Soil and Water Conservation Scholarships - Deadline is typically February. Additional information available at: http://www.swcs.org/en/members_only/scholarships/

University of Arkansas University-Wide Scholarship - UA students from any academic discipline. Must have completed at least one fall semester. High level of academic achievement coupled with leadership qualities, financial need, or have achieved academic success despite significant adversity. Deadline is typically February. Information is available at: http://scholarships.uark.edu/index.php/csschl/default

Nonresident Tuition Award - Out-of-state tuition differential for students from TX, MS, LA, KS, MO, OK, TN.

Internship Opportunities in Crop, Soil, and Environmental Science (CSES 462V)

The internship program is based upon the principle that what students learn in the workplace can be a valuable supplement to what they learn in the classroom. By combining work and study, students gain greater insight into each and may be better prepared for employment in their chosen careers. The CSES internship is designed to fit needs of the individual student, but for full credit the student must meet minimal requirements listed below. In cooperation with an employer, the course will be supervised by an internship committee.

Enrollment in the internship course (CSES 462V) is by instructor consent only. Therefore, any student wishing to enroll in the internship class must contact one of the internship committee members listed below for a copy of all current requirements and approval to enroll.

Internship Committee

Crop Science - TBD
Weed Science - Dr. J.K. Norsworthy (Altheimer Laboratory 302; 575-8740)
Soil Science/Environmental Science - Dr. K.R. Brye (Agriculture 123; 575-5742)

Requirements for academic credit:

1. Learning objectives for an internship project will be initially agreed upon by a CSES internship committee, an employer (sponsor), and the student. A written pre-proposal is required to initiate the internship and must be approved by the committee. The pre-proposal should include the following:

Internship Pre-proposal Format *(due prior to enrolling in CSES 462V)*

A. **Title:** A brief, clear, specific designation of the subject.

B. **Submitted By:** List full name, summer address and phone number where you can be contacted.

C. **Company Sponsor:** List company's full name, immediate supervisor's name, address, and phone number.

D. **Date of Submission to Committee:** During priority enrollment

E. **Dates of Internship:** Starting and ending dates

F. **Credit Hours:** List the number of semester hours of credit for which you are enrolling (generally 1 to 3 hours).

Only after the pre-proposal has been approved by the committee can the student be enrolled in CSES 462V. If the student will not complete all of the requirements prior to the end of a term (Spring/Fall/Summer), the student may postpone enrolling in the internship until the following term. There is a required workshop in the spring semester to learn about expectations and requirements to fulfill internship credit.

2. After the project is approved by the internship committee, the student will be directly responsible to one instructor who is a member of that committee. The student must submit a full proposal to the instructor two weeks after beginning employment. An outline to follow for the proposal format is available from the instructors.
3. Upon completion of the internship employment, the student must submit a final written report to the instructor. This report will be distributed to the internship committee for review and evaluation. The final report will follow the same format as the proposal.
4. In addition to the final written report, the student will make an oral presentation which summarizes his or her internship to an orientation (FYE) course, CSES Seminar, the internship committee, or other audiences.
5. At the conclusion of the internship, the internship instructor will contact the employer to discuss the employer's evaluation of the student's accomplishments during the internship

6. The internship committee will evaluate the student's performance and determine the letter grade for the course based upon fulfillment of these requirements, the initial agreement relative to the proposal, and performance throughout the project. The semester credit hours available for internship are generally 1 - 3 credit hours.

Study Abroad Opportunities

The International Programs are specifically tailored to meet the individual needs of each student (http://bumperscollege.uark.edu/internationalprograms/index.php). Programs include internships, semester or year abroad study, and faculty-led study tours (see page 25 for study tour led by CSES faculty). Students have participated in a variety of programs.

Internships

Lengths of internships vary but usually involve six to twelve weeks. These may be prearranged independent studies or working internships directed by faculty at the University of Arkansas in cooperation with a university or agency.

Semester

Longer programs are designed to give students a full semester of study abroad in their field of interest and in the country of choice. Students enroll for UA study abroad credit, and the courses transfer to the University of Arkansas. Planning in advance with their advisor allows students to build a strong academic transcript.

Year

This option is essentially the same as the semester option, in which courses taken abroad may be transferred back to the University of Arkansas. Special planning is required so that all credit hours earned abroad are transferable to the student's degree program.

Study Visits and Tours

Individualized and group study visits for two to four weeks are sometimes arranged for one student or a group of students, coordinated by various faculty. Specific student responsibilities are planned in advance with the University of Arkansas faculty advisor to complement the student's field of study and to earn academic credit.

Two study tours specific for CSES students are:

AFLS 401V-3, AFLS 401VH-3, and AFLS 501V-3 India – Merging Diverse Traditions into Modern Life) Faculty led study tour in northern India to help students develop global perspective and cultural understanding, specifically of Indian agriculture and its challenges.

Instructors: Vibha Srivastava and Mary Savin

AFLS 401V-3/AFLS 401VH-3, and GENG 3113 Belgium - Sustainability in the Euro Food System (May intersession) Exposure to sustainability concepts in terms of water, soil, and energy needs for food, fiber, and feed production. Understanding the layout of Agrofood supply chain. Analysis of food processing unit operations and of strategies to new product development in Europe. System analysis of inputs and outputs of energy, water and mass for

the purpose of producing and processing biomass for human uses. In country experience at the University of Gent, Gent, Belgium. *Instructors: Mary Savin and Benjamin Runkle*

Student Study Lounge

Computer and printer access in room 113 Plant Science; location for small groups to meet; for use by students in the Department of Crop, Soil, and Environmental Sciences.

Employment Opportunities

Students in the CSES Department are encouraged to fill out an employment application in the CSES main office (Plant Science 115). These applications are kept on file for faculty and staff to review when they are looking for student workers.

Undergraduate Activities within the CSES Department

Agronomy Club

Agronomy Club encourages proper stewardship of land and other natural resources and promotes professional development for undergraduates interested in pursuing a career in crop science or related field. Members of all majors will have the opportunity to connect with agricultural professionals and participate in Students of Agronomy, Soils, and Environmental Sciences (SASES) national meetings. The Agronomy Club is open to all majors.

Agronomy Club Officers
President:
Vice President:

Agronomy Club Advisors
Dr. Kelsey Greub (klhoegen@uark.edu)

Environmental, Soil, and Water Sciences (ESWS) Club

Environmental, Soil, and Water Sciences (ESWS) Club is designed to deepen students' understanding of soil and water conservation and foster collegiality among students interested in environmental science or advocacy. The ESWS club strives to educate the campus and surrounding community about environmental science through campus trail clean-ups, sustainable events, outreach, and networking events with soil, water, or environmental science professionals. Members of the ESWS club have the opportunity to experience professional development opportunities and compete in contests at the Students of Agronomy, Soils, and Environmental Sciences (SASES) national meetings. The ESWS Club is open to all majors.

ESWS Club Officers
President - Colten Nichols
Event Coordinator - Andie Forbes
Secretary - Joyce Ho
Treasurer - Kaitlyn Feld
Social Media Manager - Avery Selle
Sentinel - Hannah Harrison

ESWS Club Advisor
Dr. Kelsey Greub (klhoegen@uark.edu)

CSES Crops Judging Team

CSES Soil Judging Team

Each fall semester, members of the CSES Soil Judging Team meet once per week to practice for the regional soil judging competition held in October. No previous experience is necessary and you can enroll in the CSES 355v Soil Profile Description course for 1-hour credit. For more information, contact Dr. Kristofor Brye (kbrye@uark.edu; 479-575-5742).

CSES Personnel of Interest and Department Committees

Office Personnel (Plant Science 115)
Tabatha Gonzalez (575-8649; tabathag@uark.edu)
Estefani Mann (575-2354; eam005@uark.edu)
Brian Wempe (479-575-6079, bwempe@uark.edu)
Giselle Vargas (575-5718; gv001@uark.edu)

Undergraduate Recruiter

Ms. Holly Yeatman (Office: PTSC 120; Phone: 479-575-5726; hyeatman@uark.edu)

Faculty Committees of Interest

Assessment Committee – TBD
Awards Committee – Dr. Jason Kelley (501-671-2164; jk039@uark.edu)
Curriculum Committee – Dr. Kelsey Greub (klhoegen@uark.edu) (CSES Undergraduate Club President is a committee member.)
Recruitment Committee - Ms. Holly Yeatman (479-575-5726; hyeatman@uark.edu)

Undergraduate Courses in AFLS (AFLS)

AFLS 401V-3, AFLS 401VH-3, and AFLS 501V-3 Merging Diverse Traditions into Modern Life (Jan intersession) Faculty led study tour in northern India to help students develop global perspective and cultural understanding, specifically of Indian agriculture and its challenges.

Instructors: Vibha Srivastava and Mary Savin

AFLS 401V-3/AFLS 401VH-3, and GENG 3113 Sustainability in the Euro Food System (May intersession) Exposure to sustainability concepts in terms of water, soil, and energy needs for food, fiber, and feed production. Understanding the layout of Agrofood supply chain. Analysis of food processing unit operations and of strategies to new product development in Europe. System analysis of inputs and outputs of energy, water and mass for the purpose of producing and processing biomass for human uses. In country experience at the University of Gent, Gent, Belgium.

Instructors: Mary Savin and Benjamin Runkle

Undergraduate Courses in Environmental Science (ENSC)

ENSC 10001L Environmental Science Laboratory (Fa, Sp) Laboratory, field trip, and discussion sessions covering the concepts and information allowing students to critically evaluate environmental issues. Topics will include: laboratory safety, recycling, composting, geographic information systems, soil testing, water quality, hazardous wastes, waste disposal, wetlands, wastewater treatment, and sustainable food systems. Laboratory 2 hours/week. Prerequisite or Corequisite: ENSC 1003 *Instructor: Lisa Wood*

ENSC 10003 Environmental Science (Fa, Sp) Series of lectures and discussions introducing the topic of environmental science including factors related to water, soil, and air quality. (Natural science university core course with laboratory) *Instructor: Lisa Wood*

ENSC 3003 Introduction to Water Science (Sp) Properties, occurrence, and description of the types, functions, quality and quantity, potential contaminants, uses, and guiding policies and regulations of the various water resources in the environment. Prerequisite: ENSC 1003 or CHEM 1053 or higher or GEOL 1113 or higher or BIOL 1543. *Instructor: Kristofor Brye*

ENSC 3103 Plants and Environmental Restoration (Even years, Fa) Selection, establishment, and use of plants to promote soil stabilization, water quality, and wildlife habitat. Principles and practices of managing plants for soil remediation, nutrient and sediment trapping, and restoration of plant communities. Service Learning course; Prerequisite: CSES 1203 or HORT 2003 or BIOL 1613.

Instructor: Lisa Wood

ENSC 3221L Ecosystems Assessment Laboratory (Even years, Fa) The purpose of this laboratory is to complement concepts learned in lecture by carrying out experiments that familiarize students with methods used in soil and aquatic ecology. Students will collect samples, analyze and interpret data obtained from soil and water samples. Lab will meet once per week for 3 hours. Corequisite: ENSC 3223. *Instructor: Mary Savin*

ENSC 3223 Ecosystems Assessment (Even years, Fa) Applications of the basic ecological principles of organisms, populations, communities, and ecosystems to gain an appreciation for how large scale patterns in terrestrial and aquatic ecosystems are influenced by small scale interactions among individuals (microorganisms to invertebrate macrofauna) and between individuals and their local environment. Lecture 3 hours per week. Corequisite: ENSC 3221L. Prerequisite: BIOL 1543. *Instructor: Mary Savin*

ENSC 32603 Soil and Water Conservation (Even years, Fa) Effect of land use on water quality. Major sources of agricultural nonpoint pollutants. Best management practices used to minimize water quality impacts. Prerequisite: CSES 2203. *Instructor: Kristofor Brye*

ENSC 3413 Principles of Environmental Economics (Sp) An introductory, issues-oriented course in the economics of the environment. What is involved in society making decisions about

environmental quality will be studied. Environmental issues important to the State of Arkansas and the United States will be emphasized. Prerequisite: AGEC 1103 or ECON 2023. (Same as AGEC 3413) *Instructor: Kent Kovacs*

ENSC 3603 GIS for Environmental Science (Odd Years, Sp) Provide instruction on the uses of GIS techniques in solving practical environmental and agricultural land use problems. Areas include: 1) an introduction to spatial variability in soils with an emphasis on the application of GIS techniques to map and understand spatial parameters important to different land uses, and 2) development of individual experience in the use of GIS in solving environmental and agricultural problems using an oral and written term project. Prerequisite: CSES 2203.

Instructor: Vaughn Skinner

ENSC 3933 Environmental Ethics (Sp) The course addresses ethical questions about nature and the natural environment. Topics of discussion include anthropocentric and biocentric ethics, population control, obligations to future generations, animal rights, moral considerability, Leopold's land ethic, deep ecology, and ecofeminism. Lecture/discussions 3 hours/week. Prerequisite: ENSC 1003 or PHIL 2003 or PHIL 2103. *Instructor: David Miller* **ENSC 400V Special Problems** (Sp, Su, Fa) (1-3) Work on special problems in environmental science or related fields. May be repeated for up to 6 hours of degree credit. *Instructor: Faculty*

ENSC 40201L Water Quality Laboratory (Fa) Field and laboratory experience in physical, chemical, and biological characteristics of natural waters (rain, river, lake, soil, ground, etc.). Laboratory experiments in water sampling, measurement of water quality parameters such as pH, alkalinity and acidity, redox, hardness, BOD, TSS, etc., and instrumentation. Prerequisite or Corequisite: ENSC 4023. *Instructor: Faculty*

ENSC 40203 Water Quality (Fa) Physical, chemical, and biological characteristics of natural waters (rain, river, lake, soil, ground, etc.). Discussion of water quality parameters such as pH, alkalinity and acidity, redox, hardness, BOD, TSS, etc. Aquatic processes of pollutants and principles of modeling. Laboratory experiments in water sampling, measurement of water quality parameters, and instrumentation. Prerequisite: CHEM 1123 and CHEM 1121L. *Instructor: Faculty*

ENSC 4034 Analysis of Environmental Contaminants (Even years, Sp) Methods of analysis for inorganic and organic contaminants, radionuclides and microorganisms in soil and water. Quality assurance and quality control, sampling protocols, sample handling, instrumentation and data analysis. Lecture 2 hours and laboratory 4 hours per week. Corequisite: Lab component. Prerequisite: CHEM 2613/2611L or CHEM 3603/3601L. *Instructor: Mary Savin*

ENSC 404V Special Topics (Irregular) (1-3) Studies of selected topics in environmental sciences not available in other courses. May be repeated for up to 12 hours of degree credit.

Instructor: Faculty

ENSC 4263 Environmental Soil Science (Even years, Sp) Study of the behavior of pesticides, toxic organic compounds, metals, nutrients, and pathogenic microorganisms in the soil/plant/water continuum. Lecture 3 hours per week. Prerequisite: CSES 3214. *Instructor: Lisa Wood*

ENSC 4401 Professional Certification Preparation (Sp) Concepts and skills already learned in other soil and environmental science and related courses are reinforced with the opportunity to prepare to take a national certification examination. If so chosen, students may pursue certification as soil or environmental science professionals. Prerequisite: Senior standing.

Instructor: Mary Savin

Undergraduate Courses in Crop, Soil, and Environmental Sciences (CSES)

CSES 12003 Introduction to Plant Sciences (Sp, Fa) An introduction to basics of agricultural crop plant structure, growth, and production. (Same as HORT 1203) *Instructor: Greub*

CSES 2013 Pest Management (Ir) Introduction to basic principles of pest management as they relate to vertebrate animals, insects, plant disease and weeds. Selected pests are studied with emphasis on current management approaches and alternative pest control. *Instructor: Team taught*

CSES 2101L Crop Science Laboratory (Sp) A series of laboratory experiments designed to reinforce principles of plant growth and development, reproduction, classification, and the utilization of plant products. Emphasis is placed on major crop plant species. Experiments are conducted by individuals or by teams. Laboratory consists of a single, 2-hour period each week. Required for Crop Management majors. Corequisite: CSES 2103. *Instructor: Greub*

CSES 2103 Crop Science (Sp) Principles of crop growth, development, and utilization and how these principles relate to production. Emphasis on major agronomic crop species. Lecture 3 hours per week. *Instructor: Greub*

CSES 22001L Soil Science Laboratory (Fa, Sp) Field and laboratory exercises related to the study of the physical, chemical, and biological properties of soils. Laboratory mandatory for all crop management and environmental, soil, and water science majors and optional for others. Laboratory 2 hours per week. Pre- or Corequisite: CSES 2203. *Instructor: Dave Miller*

CSES 22003 Soil Science (Fa, Sp) Origin, classification, and physical, chemical, and biological properties of soils. Lecture 3 hours, discussion 1 hour per week. Corequisite: Drill component. Prerequisite: CHEM 1103 or CHEM 1074. *Instructor: Dave Miller*

CSES 3023 Crop, Soil, and Environmental Sciences Colloquium (Fa) A communicationintensive course covering topics in agronomy and environmental, soil, and water science with particular emphasis on spoken communication but also including written communication, group activities, professionalism, ethics, problem solving, and information retrieval. Colloquium workshop: 3 hours per week. Prerequisite: Junior or Senior standing only. *Instructor: TBD*

CSES 3113 Forage Management (Irregular) Forage crops for pasture, hay, and silage with reference to growth and development, production, nutritional quality, and grazing systems. Lecture 3 hours per week. Prerequisite: CSES 1203 or CSES 2103 or HORT 1203. *Instructor: TBD*

CSES 3214 Soil Resources and Nutrient Cycles (Odd years, Sp) Integration of the fundamental concepts of the biological, chemical, and physical properties of soil systems and their roles in managing soil resources. Lecture 3 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: CSES 2203/2011L, BIOL 2013/2011L. *Instructor: TBD*

CSES 33102 Cotton Production (Even years, Fa) Principles and techniques associated with

production of cotton. Recitation 2 hours per week. Prerequisite: CSES 1203 or CSES 2103 or HORT 1203. *Instructor: Faculty*

CSES 3322 Soybean Production (Odd years, Sp) An overview of the history and utilization of soybean as well as the physiological and environmental basis for the development of economical soybean production practices. Recitation 2 hours per week. Prerequisite: CSES 1203 or CSES 2103 or HORT 1203. *Instructor: TBD*

CSES 3332 Rice Production (Odd years, Fa) A study of the principles and practices involved in rice culture worldwide with major emphasis on the United States. Recitation 2 hours per week. Prerequisite: CSES 1203 or CSES 2103 or HORT 1203. *Instructor: TBD*

CSES 3342 Cereal Grain Production (Even years, Sp) An overview of the botany, production, cultural practices, soil & climatic adaptation and utilization of the major cereal grains. Prerequisite: CSES 1203 or CSES 2103 or HORT 1203. *Instructor: Esten Mason* **CSES 355V Soil Profile Description** (Fa) (1, may be repeated) Training for soil profile description writing and membership of judging teams. May be repeated for up to 2 hours of degree credit.

Instructor: Kristofor Brye

CSES 3603 Metrics for Sustainable Agriculture (Fa) Analysis of productive agricultural systems necessary to meet expanding demand worldwide for food, feed, fiber and fuel while preserving critical ecosystem services to avoid future catastrophic failures of the biosphere. Characterization of sustainable systems using well-defined metrics, indicators and indices, including reference to sustainability certifications. Metrics for soil, water, atmosphere and biodiversity. Applications in crop and animal production with scales from field to watershed to eco-region. Examining the process and methodologies of integrating metrics into indices to support sustainable supply chain decisions. Discussion of life cycle analyses and current initiatives toward approaching agricultural systems sustainability. Technical course intended for students in agriculture, biology, business, engineering, and environmental sciences. *Instructor: TBD*

CSES 4000V Special Problems (Sp, Su, Fa) (1-6) Work on special problems in crop, soil and environmental sciences or related field. May be repeated for up to 6 hours of degree credit.

Instructor: Faculty

CSES 4013 Advanced Crop Science (Sp) Fundamental concepts of crop physiology, crop improvement, seed science, and crop production systems. Recitation 3 hours per week. Prerequisite: CSES 2103. *Instructor: Team taught*

CSES 402V Special Topics (Irregular) (1-3) Studies of selected topics in crop, soil and environmental sciences not available in other courses. May be repeated for up to 12 hours of degree credit. *Instructor: Faculty*

CSES 41003 Plant Breeding (Even years, Fa) Basic principles involved in plant breeding programs to improve crop plants and seed programs. Lecture 2 hours, laboratory 2 hours per week.

Corequisite: Lab component. Prerequisite: ANSC 3123 or BIOL 2323. *Instructor: TBD*

CSES 41303 Ecology and Morphology of Weedy and Invasive Species (Fa) Study of weeds as economic pests occurring in both agricultural and nonagricultural situations and including poisonous plants and other specific weed problems. Gross morphological plant family characteristics which aid identification, habitat of growth and distribution, ecology, competition, and allelopathy are discussed. Lecture 2 hours, laboratory 2 hours a week. Corequisite: Lab component. Prerequisite: CSES 2103 (or HORT 2003). *Instructor: Nilda Burgos*

CSES 4143 Principles of Weed Control (Sp) Advanced concepts and technology used in modern weed control practices and study of the chemistry and specific activity of herbicides in current usage. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component. Prerequisite: CHEM 1073 and CHEM 1071L and CSES 2003. *Instructor: Jason Norsworthy*

CSES 42204 Soil Fertility (Fa) Study of the soil's chemical, biological and physical properties, and human modification of these properties, as they influence the uptake and utilization of the essential nutrients by plants. Lecture 3 hours, laboratory 2 hours per week. Corequisite: Lab component. Prerequisite: CSES 2201L and CSES 2203 and CHEM 1123/1121L or CHEM 1073/1071L and CHEM 2613/2611L. *Instructor: Trent Roberts* **CSES 4253 Soil Classification and Genesis** (Odd years, Fa) Lecture and field evaluation of soil properties and their relation to soil genesis and soil classification with emphasis on soils of Arkansas. Lecture 2 hours, laboratory 2 hours per week. Corequisite: Lab component. Prerequisite:
CSES 2203/2201L. *Instructor: Kristofor Brye*

CSES 4303 Bioenergy Feedstock Production (Sp) Overview of production and characteristics of cultivated crops, perennial grasses, and woody species as feedstocks for bioenergy. Fundamentals of plant growth factors, culture, harvest and storage, quality and improvement, and introduction to environmental impact, modeling, and resource utilization. Prerequisites MATH1203 and BIOL1543 or CSES1203. Courses in introductory chemistry or soil science are preferred. Online course
Instructor: TBD

CSES 4553 Wetland Soils (Odd years, Sp) Focus on wetlands and wetland soils from a jurisdictional rather than ecological standpoint. Topics include wetland hydrology, hydric soil determination, and principles of wetland identification and delineation. Field emphasis, meets 3 hours once per week (Pre-requisites: CSES 2203/2201L). *Instructor: TBD*

CSES 4620V Internship (Sp, Su, Fa) (1-6 hrs credit) Supervised practical work experience in crop management and environmental science to develop and demonstrate professional competence. Faculty approval of project proposal prior to enrollment and written and oral reports after the project is complete are required. Prerequisite: junior standing. May be repeated for up to 6 hours of degree credit. *Instructors: Kris Brye, Jason Norsworthy*

Teaching Faculty in the Department of Crop, Soil, and Environmental Sciences

Kristofor Brye (Office: AGRI 123; Phone: 479-575-5742; kbrye@uark.edu)
Professor of Applied Soil Physics and Pedology (Ph.D. University of Wisconsin, Madison)
Teaches: CSES 355V Soil Profile Description (Fa) (1-2 hrs credit);
CSES 4253 Soil Classification and Genesis (Fa, odd);
CSES 462V Internship (Sp, Su, Fa) (1-6 hrs credit); CSES 5224 Soil Physics (Sp); ENSC 3003 Introduction to Water Science (Sp); ENSC 3263 Soil and Water Conservation (Fa, even)

Nilda R. Burgos (Office: ALTH 222; Phone: 479-575-3984; nburgos@uark.edu)
Professor of Weed Science (Ph.D. University of Arkansas)
Teaches: CSES 4013 Advanced Crop Science (Sp); CSES 4133 Ecology and Morphology of Weedy and Invasive Plant Species (Fa)

Gerson Drescher (Office: CROP 120; Phone: 479-502-9708; gldresch@uark.edu)
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Teaches: CSES 4103/5073 Advanced Crop Science (Sp); CSES 5033 Advanced Soil Fertility Plant Nutrition (Sp. Even)

Elvis Elli (Office: CROP 116; Phone: 479-502-9735; eelli@uark.edu)
Assistant Professor of Crop Physiology and Adaptation to Climate Change
Teaches: CSES 5013 Crop Physiology

Samuel Fernandes (Office: AG STAT Lab; Phone: 479-575-5667; samuelbf@uark.edu)
Assistant Professor of Agricultural Statistics and Quantitative Genetics
Teaches:

Kelsey Greub (Office: PTSC 106; Phone: N/A; klhoegen@uark.edu)
Teaches: CSES 10101 Introduction to CSES (Fa even); CSES 1203 Introduction to Plant Science; CSES 2102 Crop Science (Sp); CSES 3023 CSES Colloquium (Fa); CSES 33102 Cotton Production; CSES 3342 Cereal Grain Production; ENSC 10003H Honors Environmental Science; ENSC 4401 Soil Certification

David M. Miller (Office: AGRI 106; Phone: 479-575-5747; dmmiller@uark.edu)
Professor of Soil Chemistry (Ph.D. University of Georgia)
Teaches: CSES 2203 Soil Science (Fa, Sp); CSES 2201L Soil Science Laboratory (Fa, Sp); ENSC 3933 Environmental Ethics (Odd years, Sp)

Jason Norsworthy (Office: CROP 302; Phone: 479-575- 8740; jnorswor@uark.edu)
Professor of Weed Science (Ph.D. University of Arkansas)
Teaches: CSES 2013 Pest Management (Sp); CSES 4143 Principles of Weed Control (Sp); CSES 462V Internship (Sp, Su, Fa) (1-6 hrs credit)

Andy Pereira (Office: PTSC 112; Phone: 479-575-8435; apereira@uark.edu)
Professor, Anheuser-Busch and Arkansas Wholesalers Professorship in Plant Molecular Genetics (Ph.D. Iowa State University, Plant Molecular Genetics)
Teaches: CSES 5543 Genomics (Even Years, Sp)

Aurelie Poncet (Office: CROP 114; Phone: 479-575-3979; poncet@uark.edu)
Assistant Professor of Precision Agriculture
Teaches:

Trenton Roberts (Office: PTSC 115; Phone: 479-575-6752; tlrobert@uark.edu)
Research Assistant Professor (Ph.D. University of Arkansas, Soil Fertility)
Interim Department Head of CSES
Teaches: CSES 4224 Soil Fertility (Fa), CSES 4013 Advanced Crop Science (Sp)

Vaughn Skinner (Office: Farm; Phone: 479-575-5479; jskinner@uark.edu)
Resident Director, Agricultural Research & Extension Center (Ph.D. University of Arkansas)
Teaches: ENSC 3603 GIS for Environmental Science (Odd Years, Sp)

Shannon Speir (Office: Farm; Phone: N/A; slspeir@uark.edu)
Assistant Professor of Water Quality
Teaches: CSES 4023/4020L Water Quality (Fa)

Vibha Srivastava (Office: PTSC 109; Phone: 479-575-4872; vibhas@uark.edu)
Professor of Plant Tissue Culture and Transformation (Ph.D. Jawaharlal Nehru University, New Delhi)
Teaches: AFLS 401V-3, AFLS 401VH-3, and AFLS 501V-3 Merging Diverse Traditions into Modern Life (Jan intersession) Crop Biotechnology minor advisor; CSES 52104 Analytical Research Techniques; CSES 5233 Plant Genetic Engineering

Caio Canella Vieira (Office: PTSC 105; Phone: N/A; caioc@uark.edu)
Assistant Professor of Soybean Breading
Teaches: CSES 4103/4103L Plant Breeding (Fa)

Lisa Wood (Office: AGRI 105A; Phone: 479-575-5739; lswood@uark.edu)
Clinical Assistant Professor of Soil and Environmental Science (Ph.D. University of Arkansas)
Teaches: ENSC 1003/1001L Environmental Science and Laboratory (Fa, Sp); ENSC 3103 Plants and Environmental Restoration (Fa); ENSC 4263 Environmental Soil Science (Even, Sp); CSES 1203 Introduction to Plant Science (Fa, Sp); CSES 4553 Wetland Soils (Odd, Sp)

Organizational Chart of the ESWS Student