

Bachelor of Science in Sustainable Plant Systems

-- Guidelines for Majors --

A University of Arizona Major
within the College of Agriculture and Life Sciences
coordinated by the

**School of Plant Sciences and the
Department of Soil, Water and Environmental Science**

2012 - 2013

www.ag.arizona.edu/swes

Revised January 2013

SCHOLARSHIPS

(Amounts may vary from year to year)

Fuller, W.H.

- Grad or undergrad in SWES with service to agriculture in Arizona
- Demonstrating academic excellence, good character, and professional promise
- Nominated by Soil, Water and Environmental Science, Department Head, with approval by OSFA

Buehrer, T.

- Grad or undergrad in soil and water science or environmental science
- Demonstrating academic excellence AND leadership
- Named by Dean with approval by OSFA

Smith, H. Schol

- Upper division undergrad in environmental, engineering or nutritional science
- Sub-committee nominates, Named by Dean with approval by OSFA

Ben Avery Award, Soil and Water Conservation Service (SWCS)

- Undergrad in soil or water science-related field
- Must be an Arizona resident
- Junior or Senior the year Scholarship is awarded
- Minimum GPA of 2.5

Jones, Geo

- Grad or undergrad (upper division) in Sustainable Plant Systems
- Financial need and at least 3.0 cumulative GPA
- Named by Dean with approval by OSFA

Alcorn, Stanley

- Junior/Senior in CALS majoring in plant sciences, plant pathology, agronomy, entomology, soil, water/environmental sciences
- Financial need may be considered
- Candidates must demonstrate academic merit
- Selected by Schol. Committee of College of Ag or faculty of various academic depts. Campaign AZ

Stith, Lee S.

- Junior/Senior in CALS majoring in plant sciences, plant pathology, entomology, soil, water/environmental sciences
- Financial need may be considered
- Candidates must demonstrate academic merit

Arizona Vegetable Growers Association

- Students studying agronomy
- Must be an Arizona resident

Boswell, JG

- Based on academic merit
- Sustainable Plant Systems/Agronomy majors only

B.S. Degree in Sustainable Plant Systems University of Arizona

Agronomic science (agronomy) is defined as the combination of crop and soil sciences principles and practices. At the University of Arizona in the College of Agriculture and Life Sciences (CAL S), the Plant Sciences (PL S) and Soil, Water and Environmental Science (SWES) departments provide the base courses required for an undergraduate degree in Sustainable Plant Systems. Because of this, the degree program is directed and managed by both the SWES and PLS departments.

This undergraduate program provides a solid foundation for students entering a career in modern agriculture and crop production. This degree program provides a good base for students interested in work associated with field crops, permanent tree crop production, turf science, and/or a broad array of horticultural crops that are grown throughout the western United States and other regions in the world. Fundamentals derived from this program can be applied to sustainable plant systems and land management programs locally, regionally, or globally. Also, graduates from this program will be well prepared academically to enter graduate degree programs.

Descriptions of the Departments

Plant Sciences and Plant Pathology/Microbiology:

The PL S Department includes the Division of Plant Pathology and Microbiology. Both units foster research, instruction and outreach programs that study the way plants grow and how they interact with their environment. Plant Sciences has faculty performing basic research on plant anatomy, development, physiology, genetics and environmental responses. Cooperative Extension faculty work statewide to assist the agronomic and horticulture industries. Course work includes a wide variety of subjects important to understanding and improving plants for human use and enjoyment. Further information can be found at: <http://ag.arizona.edu/pls>

The Division of Plant Pathology & Microbiology maintains instruction programs and conducts research on the molecular, cellular, organismal and ecological aspects of plant diseases. This includes work in the areas of crop production, turf science, natural resources and food safety. Further information can be found at: <http://ag.arizona.edu/PLP/plphome.html>

Soil, Water and Environmental Science:

The SWES Department has 31 faculty members, including Cooperative Extension specialists working statewide to promote agricultural science, and researchers working at various Agricultural Research Centers. The department places an educational and research emphasis on soil/nutrient/water/plant dynamics, soil salinity, and crop production, as well as environmental and soil biology, chemistry, microbiology, physics, pollution, and technology. Further information can be found at: <http://ag.arizona.edu/swes>

Overview of Major

A. General Education.

This coursework gives undergraduates a diverse academic background to complement each major at the University. It is divided as follows:

B. Core Basic Science.

This coursework gives a solid foundation in science and math. The general principles and specific analytical techniques in these classes are directly applicable to sustainable plant systems.

C. Core Soil and Water Science.

These classes provide in-depth coverage of soil physical and chemical characteristics, and soil/water interactions. Students will learn how to maintain soil for optimum plant growth, and to diagnose and treat suboptimal soil conditions.

D. Core Plant Science.

These classes present biological, chemical, and physical characteristics of plants and their interaction with the environment. Students will be able to identify plant requirements under different conditions.

E. Career Preparation Classes

Classes in this section provide miscellaneous supporting skills necessary for sustainable plant systems, including irrigation design/maintenance, economics, and technical writing.

F. Subplans.

Choose one of these Subplans to specialize in a facet of Sustainable Plant Systems

A. General Education (30-36 units) These classes give undergraduates a diverse academic background to complement each major.

Foundation Courses English Composition Mathematics (satisfied by MATH 124/125)	6 Units	Tier 1 Traditions and Cultures Individuals and Societies	6 Units 6 Units
Pre-Major Communications (satisfied by SWES 408)		Tier 2 Humanities Arts Individuals and Societies	3 Units 3 Units 3 Units
Second Language Second semester proficiency	variable		

B. General Science Core (21-23 Units) *

Course	Units	Fall	Spring
CHEM 151, 152, Intro Chemistry I & II	8	X	X
CHEM 241A Organic Chemistry	4	X	X
MATH 124 Calculus I with Applications OR MATH 125 Calculus I	5 3	X X	X X
MATH 263 Statistics OR MATH 363 Intro to Stat Methods OR MGMT 276 Stat Inference OR SBS 200 Intro to Statistics	3 3 3 3	X X X X	X X X X
PHYS 102 Physics	3	X	

*ECOL 182L Intro Biology II or MCB 181L Intro Biology I strongly recommended

C. Soil & Water Science Core (16 units, 12 upper division units)

Course	Units	Fall	Spring
SWES 200/201 Introduction to Soil Science	4	X	X
SWES 316 Soil Fertility & Plant Nutrition	3		X
SWES 401 Manage Arid Lands & Salt-Affected Soils	3		X even years
SWES 431 Soil Genesis, Morph, & Classification	3	X	
SWES 420 Environmental Physics OR SWES 470 Soil Physics	3 3	X	X

D. Plant Science Core (17 units, 13 upper division units)

Course	Units	Fall	Spring
PLS 240 Plant Biology	4	X	
PLS 312 Plant Genetics	4		X
PLS 360 Principles of Plant Physiology	3	X	
PLS 405 Weed Science	3	X even years	
SELECT 1 OUT OF 2:			
Ento 468 Insect Pest Management	3		X even years
PLP 305 Introductory Plant Pathology	3	X	

E. Career Preparation Courses (10 units, 5 upper division units)

Course	Units	Fall	Spring
SWES 195B Careers in Crop Production	1	X	
PLS 195A How Feed & Clothe...	1	X	
SWES 408 Technical Writing OR SWES 415 Translating Env Sci OR ENGL 308 Technical Writing OR COMM 312 Applied Organizational Comm OR ENGL 307 Business Writing	3 3 3 3 3	X X X X X	X X X X X
PLS 498 Capstone	2	X	X
ECON 201A Principles of Economics	3	X	X

Note: Refer to the UA online Schedule of Classes to confirm course availability.

F. Subplans (Choose one)

Controlled Environment Agriculture

(18 units, must include 12 upper division units)

Required Courses (9 Units)	Units	Fall	Spring
PLS 217 Controlled Environment Production	3	X	
PLS 397B Advanced Greenhouse Crop Prod	3		X
PLS 475A Physiology of Plant Production in Controlled Environments	3		X even years
Suggested electives: (must total 9 Units)			
ABE 456 Irrigation Systems Design	3		X
PLS 339 Nursery Systems Management	3	X odd years	
PLS 354 Sustainable Horticulture	3		X even years
PLS 463 Postharvest Physio, Tech & Prod Safety	3		X odd years
PLS 479 Applied Instrumentation for Controlled Environment Agriculture	3		X
PLS 483 Controlled Environment Systems	3	X	
ENTO 497C Greenhouse Pest Management:	3		X
PLP 305 Introductory Plant Pathology	3	X	

Environmental Horticulture

(18 units, must include 12 upper division units)

Required Courses (9 Units)	Units	Fall	Spring
PLS 235 Introductory Horticulture	3		X odd years
PLS 330 Plant Propagation	3	X odd years	
PLS 475A Physiology of Plant Production in Controlled Environments	3		X even years
Suggested electives: (must total 9 Units)			
PLS 217 Controlled Environment Production	3	X	
PLS 339 Nursery Systems Management	3	X odd years	
PLS 354 Sustainable Horticulture	3		X even years
PLS 397B Advanced Greenhouse Crop Prod	3		X
PLS 463 Postharvest Physio, Tech & Prod Safety	3		X odd years
PLS 479 Applied Instrumentation for Controlled Environment Agriculture	3		X
PLS 483 Controlled Environment Systems	3	X	
Ento 468 Insect Pest Management	3		X even years
PLP 305 Introductory Plant Pathology	3	X	

Agronomy

(18 units, must include 12 upper division units)

Required Course (3 Units)	Units	Fall	Spring
PLS 306 Crop Science and Production	3	X	
Suggested electives: (must total 15 Units)			
ABE 456 Irrigation Systems Design	3		X
AREC 315 Agribusiness Econ & Management	3	X	
ENTO 468 Insect Pest Management	3		X
GEOS 251 Physical Geology	4	X	X
SWES 454 Water Harvesting	3		X
Ento 468 Insect Pest Management	3		X even years
PLP 305 Introductory Plant Pathology	3	X	

Turfgrass Science

(18 units, must include 12 upper division units)

Required Courses (18 Units)	Units	Fall	Spring
PLS 306 Crop Science and Production	3	X	
PLS 270 Golf & Sport Turf Management	3		X
PLS 355 Turfgrass Management	3	X	
PLS 455 Turfgrass Science: Env. Stress	3	X	
AGTM 330 Turf and Landscape Technology	3		X
ABE 456 Irrigation Systems Design	3		X

Sustainable Plant Systems Minor

Students may select a Minor in Sustainable Plant Systems while having a different Major. Twenty two units are required, even if the major department guidelines differ. Nine units must be unique to this minor.

COURSEWORK	SEMESTER	UNITS
A) GENERAL SCIENCE COURSES		
SWES 195B Careers in Sustainable Plant Systems	I	1
CHEM 151 General Chemistry	I, II	4
SWES 200/201 Introduction to Soil Science	I, II	4
PLS 240 Plant Biology	I	4
TOTAL:		13
B) UPPER DIVISION COURSES (SELECT 9 UNITS)		
Students select relevant upper-division courses in consultation with an Advisor (ABE,ASM, PLP, PLS, RNR, and SWES courses)		
TOTAL:		9
TOTAL:		22

Resources for the Sustainable Plant Systems Major and Minor

Advising.

Advisors provide guidance for selecting and scheduling coursework for students throughout their academic program, and help students procure internships and jobs at graduation. Students are highly recommended to maintain contact with their advisors at least once a semester. They are there to help!

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Class Locations.

Coursework takes place on the campus of the University of Arizona, at the Campus Agricultural Center (<http://cals.arizona.edu/general/departments/cac.html>), and at other locations in Arizona.

Clubs.

Undergraduate clubs provide support and activities for students outside of the classroom. Club activities allow students to gain supplemental experience relevant to their major in an informal, friendly environment. For more information, visit the SWES Club website at:

<http://www.ag.arizona.edu/clubs/swesclub/>

Sustainable Plant System=s Major Planning Worksheet

FIRST SEMESTER (Fall)				SECOND SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
Tier I course	3			Second Language	4		
Tier I course	3			ENGLISH 102	3		
ENGLISH 101	3			CHEM 152	4		
CHEM 151	4			SWES 200	3		
ECON 201a	3			SWES 201	1		
TOTAL	16	TOTAL		TOTAL	15	TOTAL	

THIRD SEMESTER (Fall)				FOURTH SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
Tier I course	3			Tier I course	3		
ECOL 181 R	3			Focal Area or Elective	3		
PLS 240	4			PHYS 102	3		
MATH 124	5			CHEM 241a	3		
SWES 195B	1			MATH 263	3		
TOTAL	16	TOTAL		TOTAL	16	TOTAL	

FIFTH SEMESTER (Fall)				SIXTH SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
Tier II course	3			Tier II Course	3		
^x AREC 315	3			^x PLS 312	4		
^x PLS 405	3			^x PLP 305	3		
^x SWES 431	3			Focal Area or Elective	3		
^x Focal Area or Elective	3			^x ENGL 308 or SWES 408	3		
TOTAL	15	TOTAL		TOTAL	16	TOTAL	

SEVENTH SEMESTER (Fall)				EIGHTH SEMESTER (Spring)			
Recommended		Your Schedule		Recommended		Your Schedule	
Tier II course	3			^x SWES 316	3		
^x PLS 360	3			^x SWES 401	3		
^x ABE 456	3			^x Focal Area or Elective	3		
^x Focal Area or Elective	3			^x ENTO 468	3		
SWES 420	3						
TOTAL	12	TOTAL		TOTAL	12	TOTAL	

^xDenotes Upper-division Units

Sustainable Plant Systems Degree Expected Outcomes

1. Have an appreciation and knowledge of the physical Earth.
2. Understand the relationship of Sustainable Plant Systems to other areas of science and to society in general.
3. Integrate and apply the general principles of Sustainable Plant Systems to specific crop production systems.
4. Develop an awareness of the history, current conditions, and future challenges associated with crop science and production on a local and global scale.
5. Understand soils as natural entities and the factors of soil formation and erosion.
6. Understand important physical, chemical, and biological properties of soil and water.
7. Apply the basic principles of botany and plant biology to crop science.
8. Understand the functioning of nutrient cycles in terrestrial and aquatic systems.
9. Understand how to describe soils and soil profiles in the field, and relate field-observed properties to proper use of soils.
10. Understand how to properly collect soil and water samples, identify and implement appropriate analytical techniques, and interpret results.
11. Think critically as demonstrated by evaluating information from multiple perspectives, drawing reasonable conclusions, and defending them rationally.
12. Be able to create a hypothesis, design an experiment to test that hypothesis, analyze the results, and draw appropriate conclusions.
13. Communicate effectively both orally and in writing.
14. Be proficient in writing a technical report or proposal in the field of soil and crop science.