Individualized Programs and SAG

Periodic Program Review

December 2011

Self Study

Self-Study Checklist for Educational Units

Background: The self-study document is the primary resource used by the external review committee to complete the second phase of the program review process. The better the quality of the self-study the more likely the work of the review committee will be productive and yield helpful feedback for the unit.

This checklist is provided as a guideline for items to include in self-study documents. It is intended to be useful to the full range of programs that undergo review on our campus. Further, it reflects the required elements identified in part 4 of AR II-1.0-6.

This checklist may also be used to identify elements of accreditation reports that are acceptable substitutions for required elements of the self-study.

Submitted for:

Unit Name: Individualized Degree Program in Sustainable Agriculture (SAG)

By: Mark Williams, Director of Undergraduate Studies, SAG

Date: December 2011

Year of Program Review: 2007-2011

Name of Accreditation Agency: (if applicable) _____

_____

List or describe documents available for review: _____

_____

_____

Part 1	**Included (✓ or NA)**	**Page(s)**	**Other Comments**
Executive summary	x	6	
• Brief account of self-study process	x	6	
• Committee composition names and Affiliation	x	6	
• List of major recommendations	x	6	

Written Summary Report *This narrative report must describe, analyze and synthesize information about the unit. The report should include the components detailed below. Some documents may be tabled features within the text. Others may be featured as appendices. An electronic version of the report and supporting documentation is required for archival purposes.*	**Included (✓ or NA)**	**Page(s)**	**Other Comments**
Program Documents	**x**	**7**	
• Strategic plan	x	7-9	
I. Mission Statement	x	9	
➢ Instruction	x	9	
➢ Research	NA		
➢ Service	NA		
II. Goals/Objectives	x	9-10	
III. Criteria for measuring progress	x	10	
• Organization chart/Structure	x	10	
• Annual reports (SPRS or other) since the last Self-Study (List years of any missing reports:_____)	x	10	
Resources	x	11	
• **Budget** summary information & adequacy	x	11	

• **Facilities** summary information & adequacy	x	11	
• **Equipment** summary information & adequacy	x	11-12	
• **Personnel** summary information & adequacy *(including faculty & staff numbers & demographics)*	x	12	
• **Support from other university units essential to effective operations** *(e.g. research, engagement, development, alumni affairs, human resources, facilities management, financial units, and information technology)*	x	12	
Input from Affected Constituents	x	12	
• Evaluation data from **faculty**	NA		
• Evaluation data from **staff**	NA		
• Evaluation data from **students**	x	12	
Adherence to Policies and Procedures	x	13	
• Evidence of adherence to **educational policies and procedures** established through the faculty governance process *(including consistency in applying policies related to grading, probation, & termination)*	x	13	
• Evidence of consistent review and monitoring course substitution, course equivalency credits and course transfers toward degree completion	x	13	
• Evidence of adherence to procedures on **faculty personnel actions and budget request preparation** *(established jointly by the unit faculty and the unit head)*	x	13	
Evaluation of Quality and Productivity	x	13	
• Evidence of quality of collegial environment *(include climate for equity and diversity)*	x	13-14	

• Evidence of quality & productivity in instruction, research, public service, or operations *(as applicable, include degree program enrollment, student credit hours generated, retention rates, degrees awarded, grant and contract awards, outreach and engagement activities, and operational efficiencies)*	x	14-15	
• Evidence of Distance Learning Review of Distance Learning course offerings, services and outcomes to ensure compliance with best practices, SACS policies, and federal rules	x	15	
• Quality of faculty & staff employees, communications and interactions	x	15	
• Quality of orientation, advising and other student service programs	x	15	
• Quality of student learning outcomes (go to part 2)	x	15	
• Evaluation of course grade distribution by level and rank; identify strategies to monitor grade distribution	x	16	
Analysis of Strengths and Recommendations for Quality Enhancement	x	16	
• Summary of strengths	x	16	
• Recommendations for quality enhancement	x	16-17	

Part 2	**Included (✓ or NA)**	**Page(s)**	**Other Comments**
Student Learning Outcomes (Program Level)	x	18	
• Undergraduate Student Learning Outcomes statements for each degree program offered	x	19-36	
• Graduate Student Learning Outcomes statements for each degree program offered	NA		

• Curriculum Map (Course X Objectives Matrix demonstrating alignment of goals with instructional sequences)	x	24-25	
• Assessment Results	x	27	
1. Implementation plan for all major instructional objectives	x	27-36	
2. Summary of major findings/results	x	27-36	
3. Communications regarding key results	x	27-36	
4. Follow-up action taken	x	27-36	

Executive Summary

Self-Study Process

Considering that the Sustainable Agriculture Undergraduate Degree Program is not yet a fully approved curriculum, and that this is the first programmatic review for the program, materials for the document were compiled from a limited number of sources. Specifically, curriculum materials, such as curriculum maps and assessment plans, and teaching evaluations were the main sources of information used.

This document was developed primarily by the Director of Undergraduate Studies for the program, with feedback from the program's self-study committee.

Major Recommendations

Based on the present self-study, the following challenges were identified:

1. Recruiting efforts need to be increased.
2. Operating budget is inadequate.
3. As student numbers increase, advising will need to be distributed to additional faculty members.
4. There is currently no scholarship fund specifically for the program.

In order to address these challenges, recommendations were identified:

1. Establish a plan to increase recruiting efforts. Fully develop a mixed-media approach that will increase the visibility of the program at a state and national level.
2. Obtain funding to facilitate the management and future development of the program.
3. Recruit additional faculty to help with student advising as needed.
4. Seek donations to establish a scholarship fund for the program

Program Documents

Programmatic Overview

The College of Agriculture offers the BS degree in Agriculture through the Agricultural Individualized Curriculum (AICU). This program provides students a unique opportunity to develop a plan of study to meet educational goals not met by an existing degree program in the University.

The AICU program has been used in the past to test-run newly created programs such as the Agricultural Biotechnology (ABT), and the Natural Resources Conservation and Management (NRCM) programs. Each of these pilots was successful, and the college now has a BS in Agricultural Biotechnology and a BS in Natural Resources and Environmental Science (the new name for the original NRCM program). The AICU program has also been used to provide students with an opportunity to receive a major in Entomology (ENT), although there are very few students who exercise this option.

The AICU is now being used to develop and pilot a degree in Sustainable Agriculture (SAG). This program, which began in spring 2007, was the outcome of a Higher Education Challenge Grant (HECG) awarded to several faculty members in the college of agriculture. The program is designed around the three conceptual pillars of sustainability – environmental stewardship, economic profitability, and social responsibility. These ideas are integrated into the curriculum by requiring students to take courses from a range of disciplines in the natural and social sciences (e.g. plant and soil science, animal science, sociology, economics, etc.). Faculty members from multiple departments serve as instructors. Through this multidisciplinary curriculum, students are expected to develop in-depth foundational knowledge, analytical tools, and critical evaluation skills grounded in a holistic understanding of agriculture systems. Moreover, the curriculum combines practical, in-the-field knowledge with a scientific understanding of soil management and conservation, crop physiology, livestock production, integrated pest management, agro-forestry, human nutrition, and community food systems. The curriculum aims to meet current and future needs for individuals with sustainable agriculture expertise, including trained farmers, technical consultants, policy makers, educators, and others. Since the large majority of students in the Individualized Curriculum Program are pursuing degrees in SAG, this self-study document will focus exclusively on the SAG program.

Strategic Plan

Faculty in the Sustainable Agriculture Program have adopted a comprehensive strategic plan that is associated with the first of the five mission areas identified in the University of Kentucky strategic plan:

1. **Prepare students for a leading role in an innovation-driven economy and global society;**

2. Promote research and creative work to increase the intellectual, social, and economic capital of Kentucky and the world beyond its borders;
3. Develop the human and physical resources of the department to achieve the Institution's Top 20 goals;
4. Promote diversity and inclusion;
5. Improve the quality of life for Kentuckians through outreach and service.

Goal 1:
Prepare students for a leading role in an innovation-driven economy and global society

The Vision of the SAG program is to be a leader in educating students in sustainable agriculture, so that they will have the necessary skills to ultimately improve the quality of life of individuals and families in Kentucky, the nation, and the world. This will be accomplished through the continued development of rigorous academic programming.

Challenges

1. Student recruiting is a big challenge for a program dealing with non-traditional subject material.
2. Recruiting is difficult when there are limited resources for recruiting materials.
3. The two faculty advisers in the program will be overburdened with advising responsibilities if the student numbers continue to grow.
4. Many students have lower grade point averages compared to some of the other programs in the college.
5. Continually placing students into jobs related to their major may be a challenge.

Strategies

1. The program will recruit and retain students with high academic and professional potential, through increased program website development and placement of recruitment materials in high schools with prominent agriculture and biology programs.
2. The program will provide a rigorous learning environment that is conducive to success and prepares graduates to deal with local and global issues related to sustainable agriculture. Measures to increase rigor and depth of knowledge will come from efforts such as better linking program learning outcomes with course activities and exams throughout the curriculum.
3. The program will work to maximize the full scope of learning situations from those in the classroom, to more experiential, hands-on opportunities.
4. The program will foster student participation in personal and professional development opportunities beyond the classroom, including student research, student organization membership, international and travel experience, and internships. Specifically, student participation will be enhanced through increased development and support for the Slow Foods Student club, a burgeoning "campus community garden club," and increased development of individual internships with UK programs and community-based

organizations. At least 3 faculty affiliated with the SAG program are developing study abroad opportunities with a sustainable agriculture focus.

5. The program will develop a national reputation for excellence in sustainable agriculture education, and monitor curriculum offerings for contemporary relevance. These activities are supported, in part, by SAG faculty members' affiliation with the Sustainable Agriculture Education Association, a national-level organization focused on the teaching and learning of sustainable agriculture.
6. Secure additional support for college-based scholarship and recruiting programs.

Key Indicators, by 2014 the SAG program will:

1. Substantially increase the level of recruiting.
2. Increase student enrollment by 30%.
3. Increase the number of students who have a GPA of 2.5 or higher.
4. Increase the number of entering freshmen to 8-10 per year.
5. Increase the number of faculty advisers in the program as needed to an average of 10 students per faculty member per semester.

Mission Statement

To provide students with a fundamental knowledge in sustainable agriculture that is grounded in a framework integrating three conceptual pillars: environmental stewardship, economic profitability, and social responsibility. Through a combination of course work and experiential learning, the curriculum prepares students for careers in production agriculture, allied industries, agricultural entrepreneurism, and public and private sector employment.

Goals/Objectives

The SAG program aims to attract, educate, and graduate outstanding students. Educating students was the earliest mission of the College and remains the most important way that we enhance the future of the Commonwealth. Instruction is fully integrated with our other missions – research and extension. The SAG program expects its graduates to become leaders in their professions and their communities. To this end, the program must attract and graduate outstanding students with diverse backgrounds and the skills to meet the challenges of the future.

Objectives

1. To provide students with fundamental knowledge, practical field experience, integrative skills and an understanding of agriculture in the broader society;

2. To prepare students for careers in production agriculture, allied industries, and other public and private sector employment opportunities including land management and natural resource conservation;

3. To engage non-agricultural students through the recently created Sustainable Agriculture Minor so that agriculture enjoys a broader societal support base; and

4. To create within the Commonwealth an academically rigorous program that has the potential to enhance farm profitability, reduce the environmental impacts of agriculture, and strengthen the social connections between farmers and consumers.

Criteria for Measuring Progress

The learning outcomes and assessment strategy for the SAG program are found in Part 2. These are the main assessment tools that are used to evaluate success and identify areas for improvement. Since its inception in 2007, the program has undergone two rounds of assessment (2010 and 2011) and developed and implemented Improvement Action Plans based on these assessments.

Organizational Chart/Structure

Since the SAG program is multi-disciplinary, it is not completely associated with or housed in any one department in the College of Agriculture, and faculty from multiple different departments teach classes that are in the program. With that said, the Director of Undergraduate Studies (DUS) for the program, Mark Williams, is a faculty member in the Department of Horticulture. The DUS is integrally involved on a daily basis with all aspects of the program. Additionally, Krista Jacobsen, who teaches several of the classes in the core of the program (SAG prefix), is also a faculty member in the Department of Horticulture. Both faculty members report to the Chair of the department, Dr. Robert Houtz. Dr. Houtz oversees the management of the 100 acre UK Horticulture Research Farm in south Lexington, which houses the 25 acre Organic Farming Unit. One of the main experiential opportunities for students in the program, *Apprenticeship in Sustainable Agriculture* (SAG 397), is housed on 12 acres of the Organic Farming Unit.

In addition to the DUS, a Steering Committee oversees the development, assesses programmatic status, and guides changes. The ten-member committee is chaired by Lee Meyer, a faculty member in Agriculture Economics, and is made up of faculty from the departments of Horticulture, Community and Leadership Development, Plant and Soil Science, Nutrition and Food Science, and Philosophy, as well as an outside faculty member from Kentucky State University, the Manager of the Organic Farming Unit, and a SAG program graduate.

Annual Reports

There have been no reports submitted to the strategic planning report system for the Individualized Program.

Resources

Budget

The SAG program does not currently have a budget and receives no continuous or program-specific funding from the college or university.

In 2011, the Provost approved the creation of a position that would contribute to the program by teaching several of the SAG core classes. This position was filled with the hiring of Krista Jacobsen.

The Department of Horticulture has provided funding over the last two years for 3-4 summer employees that work on the Organic Farming Unit that supports the apprenticeship program (*Apprenticeship in Sustainable Agriculture*, SAG397). The department and college also provide the land and cover water, electric, and fuel costs for the Organic Farming Unit. All other operating expenses for the apprenticeship come from proceeds generated by the community-supported agriculture (CSA) program that is part of the apprenticeship. (http://www2.ca.uky.edu/sustainableag/csa)

One of the classes in the program, *Sustainable Plant Production Systems* (SAG386), has a lab fee associated with it that pays for van rental that is used to take students on field trip to farms and other agricultural enterprises.

Facilities

Office Space

The Department of Horticulture provides office space for the two faculty members most heavily involved with the SAG program, Mark Williams and Krista Jacobsen. The UK Horticulture Research Farm houses the 12-acre apprenticeship program that is a cornerstone of the experiential learning component of the curriculum. A portable office has been rented during the growing season for the Farm Manager and CSA Manager of the Organic Unit. This is a situation that could be improved by building a small permanent office to house the administrative aspects of the apprenticeship program. Additionally, there is currently no bathroom facility on the Organic Farming Unit. Student apprentices and staff are forced to walk to the main facility on the farm. This is definitely a sub-par situation.

Equipment

The Department of Horticulture and/or College of Agriculture have provided computers for the two faculty members most heavily associated with this program. There are projectors in the classrooms where lectures are given. This equipment is adequate to facilitate classroom learning.

The Organic Farming Unit has a complete array of farming-related machinery. It is fully equipped to allow student apprentices to experience and learn a large spectrum of techniques associated with operating a highly diverse vegetable and fruit farm. This equipment includes tractors, tillage implements, cultivation tools, pesticide application equipment, trucks, wagons, buildings, and a cooler.

Personnel

There are currently two faculty members that are most deeply involved with teaching the SAG core classes and advising students. Additionally, there are faculty members from many different departments that teach classes that are used by the program, and several of these faculty members are actively supporting the program. There are two full time staff members that work on the Organic Farming Unit and are associated with the apprenticeship. They are both paid through proceeds generated by the CSA program.

Support from Other University Units

The College of Agriculture and University of Kentucky has provided excellent support for this program.

- The College of Agriculture Communications Services has provided written coverage and publicity of the development of the SAG program and has highlighted various student and faculty accomplishments in a range of media formats.
- The College of Agriculture Communications Services has provided assistance with updating the existing SAG website (http://www2.ca.uky.edu/sustainableag/).
- The University Dining Services group has providing outstanding support towards cooking for events associated with the program. Additionally, Chef Bob Perry from the Department of Nutrition and Food Science has assisted with many of the food-related events conducted by the program.
- The Tracy Farmer Center for Sustainability and the Environment has provided technical support for developing a website to advertise the SAG program.
- The UK Recycling and Federal Excess Programs have been excellent sources for acquiring equipment, furniture, and materials for the Organic Farming Unit.

Input from Affected Constituents

Considering that this is a relatively new undergraduate program, input from affected constituents is based solely on student evaluations for the SAG core classes. They can be found on pages 47-48 of this document.

Adherence to Policies and Procedures

Evidence of Adherence to Educational Policies and Procedures

Faculty involved with the SAG program follow University and College policies related to teaching. In particular, faculty follow guidelines established in Part XI of the Governing Regulations for the University relating to the student code of conduct (http://www.uky.edu/StudentAffairs/Code/part1.html). Additionally, faculty in the program make every effort to create a safe and respectful learning environment in the classroom and field. Although there have never been problems with students in the program regarding grading or academic integrity, the Academic Ombud (http://www.uky.edu/Ombud/) would be utilized if this situation occurred in the future.

Evidence of consistent review and monitoring course substitution, course equivalency credits and course transfers toward degree completion

Course substitutions are handled through the DUS in consultation with the Office of Academic Programs in the College of Agriculture. A form is provided by the office and is filled out by the student and DUS. The substitution is then reviewed by the Associate Dean for Instruction or one of his staff, and a decision is made.

Course equivalencies are typically determined using the equivalency calculator (http://www.iris.uky.edu/TransferEquivalency/) that is part of the UK Office of the Registrar website (http://www.uky.edu/Registrar/). If problems arise the Registrar's office is contacted directly.

Evidence of adherence to procedures on faculty personnel actions and budget request preparation

Since the SAG program is multi-disciplinary, there are no faculty members that are exclusively identified as solely associated with the program, and the program is not directly owned or housed in any one department. There is currently no budget for the program.

Evaluation of Quality and Productivity

Evidence of Quality of Collegial Environment

The SAG faculty enthusiastically endorses the University of Kentucky goals and objectives to

promote diversity and inclusion. The faculty agrees that diversity is one of the strengths of American society and the program shares the University of Kentucky's goals to help students:

- attain a deeper understanding of and commitment to authentic democratic values and social justice.
- embrace a greater commitment to service and leadership for the common good.
- exhibit greater cultural knowledge and competence.
- play a personal role in Kentucky's success in the global economy

Additionally, faculty work to create a safe environment where the entire community of students, faculty, and staff associated with the program feel respected and valued.

Evidence of Quality and Productivity in Instruction

Considering that the SAG program has been designed as a four-year program, and it is only five years old, we have only had three groups of students graduate from the program to date. In 2009, our first graduating class had 4 students, in 2010 we had 2 students graduate, in 2011 we have had 3 students graduate. Although these numbers have been small, the increasing enrollment is likely to result in increased graduation numbers in the near future.

The following table depicts student enrollment for both the major and minor in the SAG program.

Year	2007	2008	2009	2010	2011
Majors	4	9	16	20	28
Minors	0	3	5	5	6

The creation and development of this program has lead to two peer-reviewed publications:

1. Mark Keating, Victoria Bhavsar, Herbert Strobel, Larry Grabau, Michael Mullen, Mark Williams. 2010. Engaging Agriculture and Non-Agriculture Students in an Interdisciplinary Curriculum for Sustainable Agriculture. *NACTA Journal*. 54 (4) pp 24-29
2. Tanaka, K., M. Williams, K. Jacobsen and M. Mullen. Sustainably Growing Farmers of the Future: Undergraduate Curriculum in Sustainable Agriculture at the University of Kentucky. In Bartels, K. and K. Parker, *Teaching Sustainability / Teaching Sustainably.* Stylus Publishing, Herndon, VA. *In press.*

Further evidence of quality and productivity:

1. The DUS of the program was awarded the NACTA (North American Colleges & Teachers of Agriculture) Teacher Fellow Award. June 2009.
2. Faculty in the SAG program co-hosted the 4th National Sustainable Agriculture Education Association SAEA) at the University of Kentucky in August 2011. This event brought together over 200 students, faculty and staff in Sustainable Agriculture-oriented programs across the country for a 2 day conference on teaching and learning issues in sustainable agriculture education.

3. A pre-conference entitled "State of Sustainable Agriculture Education at Land Grant Universities" was held prior to the SAEA national conference. Faculty and student representatives from 6 Land Grant Universities with majors or minors in Sustainable Agriculture attended a full day workshop to discuss their programs, their successes, challenges, and pedagogy-related issues. The outcome of this workshop has been the preparation of 5 articles for a special edition of the Journal of Agriculture, Food Systems and Community Development (submitted in mid-December, 2011).

Evidence of Distance Learning Review of Distance Learning course offerings

There are currently no distance learning courses being taught in the SAG program.

Quality of Faculty and Staff Communications and Interactions

Considering that this is the first review of our program, and that the program is not specifically associated with any department, we have had no prior reason to conduct surveys to assess communications and interactions between faculty and staff. There are only two staff members associated with this program and they are specifically involved with one class (SAG397). They communicate on an almost daily basis with the instructor of that course, and meet in person at least once a week with the instructor. This openness and close interaction has ensured that there have been no problems thus far with communication.

Quality of Orientation, Advising and Other Student Service Programs

Since this is an undergraduate curriculum there is no specific orientation used beyond what is offered by the university and college.

One of our assessment tools is an exit interview with our graduates. In the interview, one of the questions pertains to advising, which allows students to relay their experiences and opinions. We have thus far graduated nine students from the program and all have overwhelmingly stated that their advisor interactions were very positive and helpful, and that the commitment to their education shown by the advisor was one of the strengths of the program.

Regarding retention rates – we have had three students drop out of the program since 2007. One of those switched to another major due to time constraints for graduating from our program, but continued as a minor. The other two dropped out of college for unknown reasons.

Quality of Student Learning Outcomes

Please refer to Part 2 of the present document for a detailed description of student learning outcome activities.

Evaluation of course grade distribution by level and rank. Identify strategies to monitor grade distribution

Grade distributions have not been evaluated for SAG core courses. This data will be tabulated by the DUS for each of the SAG core courses in the future. To do this the grading tabulation tool on the Faculty Services site on the MyUK website (https://myuk.uky.edu/irj/portal) will be used.

Analysis of Strengths and Recommendations for Quality Enhancement

Summary of Strengths

Strengths in the SAG undergraduate program include:

- An active faculty who are committed to developing a top-tier sustainable agriculture program.
- A passionate student body that is committed to using the ideas of sustainability to change our agricultural system so that it can meet our future needs without increasing its negative impacts on the planet and our species.
- A commitment to developing assessment tools that can aid in programmatic development.
- A first-rate farm that houses the apprenticeship program.
- Strong experiential learning opportunities.
- Strong administrative support from the College of Agriculture and University.

Recommendations for Quality Enhancement

Challenges include:

1. Recruiting efforts need to be increased.
2. Operating budget is inadequate.
3. As student numbers increase, advising will need to be distributed to additional faculty members.
4. There is currently no scholarship fund specifically for the program.

Part 2

Undergraduate Student Learning Outcomes

University of Kentucky

Assessment Inventory for General Education and Degree Programs

College:

__Agriculture_____

_____

Department:

_____

__

General Education/Degree Program: _____

Undergraduate/Graduate/Professional: ____Sustainable Agriculture_____

Part I: Inventory of Statements and Plans

1. Is there a written mission statement or statement of purpose for this program and/or the department or unit within which the program is located?	___X___ _ *If Yes, please copy and paste, attach a copy or send a link*
2. Have you articulated student learning outcomes which describe what a student should know or be able to do when they have completed this program?	___X___ *If Yes, please copy and paste, attach a copy or send a link*
3. Have you chosen a method(s) of assessment for measuring student learning outcomes?	___X___ *If Yes, please copy and paste, attach a copy or send a link*

4. Do you have a document (such as a curriculum map) that links student learning outcomes to the program curriculum?	___X___
	If Yes, please copy and paste, attach a copy or send a link
5. Have you determined an assessment cycle and fully articulated an assessment plan?	___X___
	If Yes, please copy and paste, attach a copy or send a link
6. Does this program have an accreditation process(es) separate from SACS?	_____

Part II: Assessment of Outcomes

During the past year, has your program used any of the following for assessment of outcomes?
Please indicate:
"A" if currently being used
"B" if not currently being used but interested in using
"C" if not appropriate/applicable

**Note: the following is not an exhaustive list; please feel free to add any other direct or indirect methods of assessment you may use, as necessary.*

Direct methods of assessment:	**(Enter A, B, C)**
1. Comprehensive exams	**___C___**
2. Writing proficiency exams	**___A___**
3. National examinations assessing subject matter knowledge (e.g. Major Field Achievement Test)	**___C___**
4. Graduate Record Exam General Test (GRE)	**___C___**
5. GRE Subject Test	**___C___**
6. Certificate examinations	**___C___**
7. Licensure examinations	**___C___**
8. Locally developed pre-test or post-test for subject matter knowledge	**___B___**
9. Major paper/project	**___A___**

10. Portfolio containing representative examples of student work ___B___
11. Capstone course work (e.g. senior level seminars) ___A___
12. Audio/video recording of presentations/performances ___C___
13. Employer/supervisor internship/practicum report ___A___
14. Summative performance assessment (i.e. recitals, art exhibits, etc.) ___C___
15. Theses/Dissertations ___C___
16. Student publications and presentations of research work ___C___
17. Documented lab demonstrations/exercises ___A___
18. Other: _____

_____

_____ _____

___

_____ _____

___

Part II: Assessment of Outcomes - Continued

Indirect methods of assessment: (Enter A, B, C)

1. Job placement of graduating students ___A___
2. Employer surveys and questionnaires ___B___
3. Graduate School acceptance rates ___B___
4. Student graduation/retention rates ___B___
5. Exit Interviews ___A___
6. Student satisfaction surveys ___B___
7. Student Course evaluations ___A___
8. Focus group discussions ___A___
9. Alumni surveys ___C___
10. Tracking of alumni honors, awards, and achievements at local, state, and national levels ___B___
11. Identification and assessment of at-risk students ___B___
12. Analysis of student grade distributions ___A___
13. Examiniation of information contained in department's own database ___C___
14. Other evaluations of course instruction (e.g., chair or peer review) ___A___
15. Curriculum/syllabus analysis (e.g., analysis of transfer student preparation) ___A___
16. Community perception of program effectiveness ___B___
17. Community service/volunteerism participation ___A___
18. Other: _____

_____

_____ _____

___

_____ _____

___

Part III: Other Information

1. Has this program used any of the direct or indirect methods listed above to improve student learning, operational effectiveness, student services, and/or general operations? **___X___**

If Yes, please briefly note 1 - 3 examples

Example 1: The curriculum requires an internship that with documentation of student experience and a post internship evaluation

Example 2: SAG 101 and SAG490 include service-learning opportunities that link togther issues in sustainable agriculture with participatory action

Example 3: Exit interviews have been used to provide information to course instructors and to begin changes in the internship program.

2. What resources (i.e., training, personnel, technology, etc.) does this program need to develop and/or implement better methods for assessing and improving student outcomes and program effectiveness? As a relatively new program, we'll wait to use the data that we are collecting now to assess the program and improve outcomes. Assistance in reviewing our evaluation instruments would be helpful.

3. Please list any additional comments or concerns.

Completed by: Mark Williams and Krista Jacobsen _____ Date: _12

Assessment Inventory Undergraduate Program in Sustainable Agriculture

Contact: Mark Williams, Director of Undergraduate Studies (SAG)
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Mission Statement: Undergraduate Program in Sustainable Agriculture (SAG)

To provide students with a fundamental knowledge in sustainable agriculture that is grounded in a framework integrating three conceptual pillars: environmental stewardship, economic profitability, and social responsibility. Through a combination of course work and experiential learning, the curriculum prepares students for careers in production agriculture, allied industries, agricultural entrepreneurism, and public and private sector employment.

Learning Outcomes: Undergraduate Program in Sustainable Agriculture (SAG)

1. Describe and apply the environmental stewardship component of sustainable agriculture;

2. Describe and apply the social well-being component of sustainable agriculture;

3. Describe and apply the economic viability/responsibility component of sustainable agriculture;

4. Assess food systems using an integrated understanding of sustainable agriculture;

5. Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Learning Outcomes Curriculum Map **Sustainable Agriculture** *(Version – October 17, 2009)*		**Learning Outcome 1** *… Describe and apply the environmental stewardship component of sustainable agriculture…*	**Learning Outcome 2** *… Describe and apply the social well-being component of sustainable agriculture …*	**Learning Outcome 3** *… Describe and apply the economic viability/responsibility component of sustainable agriculture …*	**Learning Outcome 4** *… Assess food systems using an integrated understanding of sustainable agriculture …*	**Learning Outcome 5** *… Evaluate the sustainability of a site specific situation by applying a fundamental understanding of sustainable agriculture principles …*
Pre-major Requirements	BIO 150 Principles of Biology I	Introduced	- - - -	- - - -	- - - -	- - - -
	BIO 152 Principles of Biology II	Introduced	- - - -	- - - -	- - - -	- - - -
	CHE 105 General College Chemistry I	Introduced	- - - -	- - - -	- - - -	- - - -
	CHE 107 General College Chemistry II	Introduced	- - - -	- - - -	- - - -	- - - -
	CHE 111 Laboratory to Accompany General Chemistry I	Introduced	- - - -	- - - -	- - - -	- - - -
	CHE 113 Laboratory to Accompany General Chemistry II	Introduced	- - - -	- - - -	- - - -	- - - -
	ECO 201 Principles in Economics I	- - - -	- - - -	Introduced	- - - -	- - - -
	GEN 100 Issues in Agriculture	*varies*	*varies*	*varies*	*varies*	*varies*
	NFS 212 Introductory Nutrition	- - - -	Introduced / Emphasized	Introduced	Introduced	- - - -
Major Requirements	ASC 382 Principles of Livestock Production	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized	Introduced	Introduced / Emphasized
	ENT 300 General Entomology	Emphasized	- - - -	Introduced / Emphasized	Introduced	Introduced / Emphasized
	PLS 404 Integrated Weed Management	Emphasized	- - - -	Introduced / Emphasized	Introduced	Introduced / Emphasized
	PLS 366 Fundamentals of Soil Science	Emphasized	- - - -	Introduced / Emphasized	Introduced	Introduced / Emphasized
	PPA 400G Principles of Plant Pathology	Emphasized	- - - -	Introduced / Emphasized	Introduced	Introduced / Emphasized
	PLS 386 Plant Production Systems	Emphasized / Reinforced	Emphasized	Emphasized / Reinforced	Emphasized	Emphasized
	AEC 302 Agricultural Management Principles	Emphasized / Reinforced	Introduced / Emphasized	Emphasized / Reinforced	Emphasized	Emphasized
	AEC 305 Food and Agricultural Marketing Principles	Emphasized / Reinforced	Introduced / Emphasized	Emphasized / Reinforced	Emphasized / Reinforced	Emphasized
	AEC 445G Introduction to Resource and Environmental Economics	Emphasized / Reinforced	Introduced / Emphasized	Introduced / Emphasized	Emphasized / Reinforced	Emphasized / Reinforced
	PHI 336 Environmental Ethics	Emphasized / Reinforced	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized
	SOC 360 Environmental Sociology	Emphasized / Reinforced	Reinforced	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized
	SOC 420 Community Analysis or SOC 517 Rural Sociology	Introduced / Emphasized	Reinforced	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized

	SAG 101 Introduction to Sustainable Agriculture	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized	Introduced / Emphasized
	SAG 201 Cultural Perspectives on Sustainability	Emphasized / Reinforced	Reinforced	Emphasized / Reinforced	Reinforced	Reinforced
	SAG 397 Apprenticeship in Sustainable Agriculture	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced
	SAG 490 Integration of Sustainable Agriculture Principles	Reinforced	Reinforced	Reinforced	Reinforced	Reinforced
	GEN 300-004 Agroecology	Reinforced	Emphasized / Reinforced	Emphasized / Reinforced	Reinforced	Reinforced

Source:
Norfolk State University – Curriculum Mapping Process Steps (Source: Site Accessed 8/31/09 http://eknowledgediscovery.com/yahoo_site_admin/assets/docs/CurriculumMappingProcess.40174545.pdf)
Introduced - STUDENTS ARE INTRODUCED TO CONTENT/SKILL. Students are not expected to be familiar with the content or skill at the collegiate or graduate level. Instruction and learning activities focus on basic knowledge, skills, and/or competencies and entry-level complexity."
Emphasized - THE CONTENT / SKILL IS EMPHASIZED AND TAUGHT IN DEPTH. Students are expected to possess a basic level of knowledge and familiarity with the content or skills at the collegiate or graduate level. Instruction and learning activities concentrate on enhancing and strengthening knowledge, skills, and expanding complexity."
Reinforced - THE CONTENT/SKILL IS REINFORCED WITH ADDITIONAL EXPOSURE TO THE INFORMATION. Students are expected to possess a strong foundation in the knowledge, skill, or competency at the collegiate or graduate level. Instructional and learning activities continue to build upon previous competencies and increased complexity."

SAG – Assessment Methods

For the first cycle of assessment (2010-2012), we will use the following direct and indirect assessments:

Direct assessments:

Sustainable Agriculture (SAG 101) will be used to assess student knowledge of the principles of sustainable agriculture upon entering the curriculum and their ability to apply these principles in a site-specific context based on their experiences in the greater Lexington Community Food System. Learning Outcomes 1-3 will be assessed through written assignments and reflections designed to apply course concepts to the greater Lexington Community Food System, while Learning Outcomes 4 and 5 are assessed through problem-based essays on midterm and final exams. The latter will be used as a "baseline" assessment in student portfolios designed to track student progress in the curriculum, discussed further below.

Integration of Sustainable Agriculture Principles (SAG 490) is a senior capstone class that will be used to assess all five Learning Outcomes, above. Students are expected to demonstrate the ability to draw conclusions and make recommendations based on an interdisciplinary understanding of sustainable food production systems. Students are required to present findings from a semester-long project to an audience of their peers, interested professionals and community stakeholders, and also produce a written report of findings and recommendations.

Internships are evaluated through a combination of participation points and a daily journal. Beyond fulfilling the required number of class hours, students will be evaluated based on their work ethic and mastery of critical agricultural skills relevant to their particular internship. A daily journal is kept to catalog the experiential learning process and to serve as a tool for personal reflection.

Student portfolios will be used to accurately assess individual student progress through the curriculum. For all students a collection of selected work throughout the SAG core courses that examine student progress in the Learning Outcomes, and specifically student ability to analyze complex, interdisciplinary issues in sustainable agriculture. Portfolios will consist of the mid-term and final examinations in SAG 101, the final examination and farming systems plan and sustainability evaluation project in PLS 386, and the final project in SAG 490. The exams and assignments are problem-based and designed to examine the students' ability to understand and communicate the nuances in evaluating sustainability in site-specific contexts.

Indirect assessments:

An exit interview will be used to determine student satisfaction with the curriculum. Comments from students are collated, and where they coalesce into a common experience, are used as a guide to make course and program changes. These interviews will be conducted yearly with graduating seniors.

Student course evaluations are used by the University to provide students the opportunity to evaluate all courses and instructors. In addition to the standardized university evaluations, customized evaluations will be used mid-term and at the end of the semester in SAG 101, and SAG 490. These evaluations are designed to assess student satisfaction and how well the course is meeting/has met learning expectations. The results will be used to guide changes in pedagogy and course content.

Annual Student Assessment Learning Report 2010

College/Unit: College of Agriculture
Program/Unit: Individualized Degree: Sustainable Agriculture – Bachelor of Science
Improvement Project: Spring 2010SAG
Assessment Date: October 31, 2011

Outcome:

Title: Learn and apply introductory Sustainable Agriculture Principles

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods:
Assessment tools: Students were given written assignments to evaluate their ability to apply concepts using the local food system as a model. Additionally problems-based essays on mid-term and final exams were used to assess mastery of the topics and establish a baseline level of knowledge for incoming students into the curriculum.

Benchmark/Target: All students demonstrated a basic understanding of the ways in which the three components of sustainable agriculture can be integrated and applied.

Results: Although there was a range of mastery exhibited, all students gained a foundational knowledge of the three components of sustainable agricultural systems and learned how to apply these concepts in an evaluation of our local food system.

Analysis: Dr. Jacobsen assessed exams and student knowledge using a grading rubric.

Improvement Action: The grading rubric will be evaluated and potentially changed to most effectively assess mastery of the topics.

Graphic/Tabular Data Attached:

Outcome:

Title: Applying Sustainable Agricultural Practices in an Experiential Environment

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods:
Assessment Tools: Students worked for a growing season as apprentices on the UK Organic Farming Unit's CSA program. Hours worked were tracked and daily work journals were evaluated to ensure that the range of skills required for the apprenticeship were mastered

Benchmark/Targets. All students worked the entire number of hours required for the apprenticeship. All students gained first-hand experience in the techniques and skills used on our farm.

Results: All students did not complete the required number of hours in the apprenticeship.

Analysis: Dr. Williams tracked the number of hours worked and assessed mastery of the topics through reading student journals to confirm that all job areas had been attempted/mastered by each student.

Improvement Action: The daily work journals do not seem to be an affective way to directly assess student learning, as they are being done inconsistently. In the future, weekly group discussions will be done instead to determine what jobs the students have done and what skills have been mastered.

Graphic/Tabular Data Attached:

Outcome:

Title: Capstone Class, Student portfolios

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods: Assessment tools: Students wrote a business plan that integrated all three components of sustainable agriculture into a system of there own choosing. The goal was from them to discuss what farming/food system they would develop upon graduation or describe what job or future career they planned on pursuing.

Benchmark/Target: Students showed a deep understanding of the concepts of sustainable agriculture and were able to develop holistic management plans based on their individual interests.

Results: All students completed the main course paper to a satisfactory level.

Analysis: Dr. Williams assessed student learning by evaluating and grading the student papers and numerous course discussions.

Improvement Action: A grading rubric needs to be developed for the main paper in this class to more consistently evaluate attainment of the learning outcomes.

Student portfolios were judged to be unnecessary due to the replication of assessments from SAG101 and SAG490. They will no longer be required.

Graphic/Tabular Data Attached:

Annual Student Assessment Learning Report 2011

College/Unit: College of Agriculture
Program/Unit: Individualized Degree: Sustainable Agriculture – Bachelor of Science
Improvement Project: Spring 2011SAG
Assessment Date: October 31, 2011

Outcome:

Title: Learn and apply introductory Sustainable Agriculture Principles

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods:
Assessment tools: Students were given written assignments to evaluate their ability to apply concepts using the local food system as a model. Additionally problems-based essays on mid-term and final exams were used to assess mastery of the topics and establish a baseline level of knowledge for incoming students into the curriculum.

Benchmark/Target: All students demonstrated a basic understanding of the ways in which the three components of sustainable agriculture can be integrated and applied.

Results: Although there was a range of mastery exhibited, all students gained a foundational knowledge of the three components of sustainable agricultural systems and learned how to apply these concepts in an evaluation of our local food system.

Analysis: Students are entering the program with various levels of knowledge regarding sustainable agriculture. This class is introducing these students to the three pillars of sustainability (environmental stewardship, economic profitability, social responsibility) and they are capable of applying these ideas to evaluate local food systems.

Improvement Action: A short exam/survey will be developed to assess incoming knowledge regarding the principles of sustainable agriculture. The mid-term and final exam rubric will be modified to more accurately allow an assessment of what students have learned in the class.

Graphic/Tabular Data Attached: The final examination and grading rubric for this class is attached.

Outcome:

Title: Applying Sustainable Agricultural Practices in an Experiential Environment

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods:
Assessment Tools: Students worked for a growing season as apprentices on the UK Organic Farming Unit's CSA program. Hours worked were tracked and weekly meetings were conducted to ensure that the range of skills required for the apprenticeship were mastered. This was based on student discussion and instructor evaluation.

Benchmark/Targets. All students worked the entire amount of hours required for the apprenticeship. All students gained first-hand experience in the techniques and skills used on our farm.

Results: All students did not complete the required number of hours in the apprenticeship.

Analysis: Dr. Williams tracked the number of hours worked and assessed mastery of the topics through weekly discussions to confirm that all job areas had been attempted/mastered by each student.

Improvement Action: In the future a point system will be developed such that each hour that is worked will equate to a single point. This would allow a clear understanding of point scoring (e.g. 200 hours worked = 200 points total). Additionally, there will be a requirement to have accumulated a specific number of hours by certain times in the year. This will ensure that students are actively working on the farm and gaining the skills required in the apprenticeship.

Graphic/Tabular Data Attached:

Outcome:

Title: Capstone Class, Exit interviews

Linked to Student learning Outcomes:
Describe and apply the environmental stewardship component of sustainable agriculture

Describe and apply the social well-being component of sustainable agriculture

Describe and apply the economic viability/responsibility component of sustainable agriculture

Assess food systems using an integrated understanding of sustainable agriculture

Evaluate the sustainability of a site-specific situation by applying a fundamental understanding of sustainable agriculture principles.

Methods: Assessment tools: Students wrote a business plan that integrated all three components of sustainable agriculture into a system of there own choosing. The goal was from them to discuss what farming/food system they would develop upon graduation or describe what job or future career they planned on pursuing.

Benchmark/Target: Students showed a deep understanding of the concepts of sustainable agriculture and were able to develop holistic management plans based on their individual interests.

Results: All students completed the main course paper to a satisfactory level.

Analysis: Dr. Williams assessed student learning by evaluating and grading the student papers and numerous course discussions.

Improvement Action: A grading rubric needs to be developed for the main paper in this class to more consistently evaluate attainment of the learning outcomes.

A post graduation survey needs to be developed to accurately assess student reflections on the program and how it has prepared them for employment.

Graphic/Tabular Data Attached:

SAG 101
Final Exam

This take home, open book exam is due by Friday, December 17th, 8 a.m. Late assignments will be accepted only under extenuating circumstances. Electronic submission is welcome, but must be submitted prior to the due date. This exam is worth 20 points.

The Scenario

It is a beautiful, crisp autumn morning. The sun is shining, the leaves are awash in seasonal reds and golds, but a very sad event has transpired. Your great Uncle Denny has passed away after a long life on a farm that you visited frequently in your youth. You recall fond memories of you and your cousins running around the pastures and pens of this somewhat dilapidated horse farm. You are in your Sunday best, and are comforting loved ones, celebrating his rich life, and awaiting the lawyer's reading of Uncle Denny's last will and testament. After many tears and many minutes of legal mumbo jumbo, the lawyer informs the crowd assembled that *you* are the sole heir of his 150 acres in the beautiful Bluegrass Region of Kentucky. Your family cheers, as they know that you are the rightful steward of this treasured family asset.

The Assignment

After your experience in Sustainable Agriculture 101 at the University of Kentucky, you have decided that not only do you want this land to be productive and profitable; you also want its fruits to be a contribution to the community food system of the Bluegrass. Your final assignment is to create a plan of for this land, discussing what you will produce, how it will sustain your livelihood, and how it will contribute to your community. This plan should incorporate what you have learned about the greater Lexington community food system and some of the key topics in sustainable agriculture introduced in this class. You are free to be as creative as you like and to incorporate any tools that help convey your vision for your farm (pictures, figures, tables, web links, etc.).

This plan should be a minimum of 3 pages in length. The questions below are provided to help structure your plan and provide opportunities for you to reflect upon what you have learned in this class. **Each question below (in bold) is worth 4 points each, 20 points total.** You may answer these questions in any order, and you are free to elaborate beyond these questions. You will be evaluated on the thoroughness of your answers to these questions and your ability to articulate your vision for this property. Please be sure to reference any sources throughout the document and provide a reference list.

1. **What will you produce on your land, and how will you work towards a sustainable production system?** Recalling that sustainability is a product of environmental stewardship, economic profitability and social responsibility, please discuss at least one component of your operation that contributes to each of these three "pillars" of sustainability in your answer. Why did you choose these components?

2. **How much land will you need?** Will 100 acres suit your needs? If so, what will you do with the additional land? If not, how do you plan to address this?

3. **How will your operation contribute to the greater community food system, based on what you learned about our food system this semester and/or your personal experience?** In your opinion and from what you saw exploring the greater Lexington Community Food System, why does the community need your operation?

4. **How will you market your good or products?** Where will you market them and who is your target audience? What marketing challenges might you face?

5. **What additional resources will you need (mention at least 2 concepts from SAG 101)?** Uncle Denny had some basic farm equipment, such as a tractor and implements, a barn, and a few animal pens in need of repair. What additional equipment might you need? Will you need additional startup capital, and how might you obtain this? What people, resources or agencies might provide you technical support?

Good luck and have fun!

Final Exam Assessment Rubric

Question	Excellent (4 points)	Good (3 points)	Fair (2 points)	Poor (0-1 points)
Q1: What will you produce and how will you work toward sustainable production?	Outlines a production plan and effectively addresses the "3 pillars" of sustainability.	Outlines a production plan and addresses the "3 pillars" with some minor gaps.	Outlines a production plan and addresses the "3 pillars" with some major gaps.	Fails to outlines a production plan and/or addresses any of the "3 pillars."
Q2: How much land do you need?	Specifically states amount of land needed and plan for acquiring or eliminating excess.	Specifically states amount of land needed, with some minor information missing.	Specifically states amount of land needed, with some major information missing.	Does not state how much land will be needed.
Q3: How does the operation contribute to the community food system?	Specifically states how the operation meets a community need; incorporates observations from class or personal experience.	Specifically states how the operation meets a community need, but little context for answer.	Specifically states how the operation meets a community need, but no context for answer.	Does not state how operation will contribute to community food system.
Q4: How will you market your goods?	Specifically states where and to whom products will be marketed. Discusses challenges that may be faced and how to overcome them.	States where and to whom products will be marketed, but incomplete discussion of challenges.	States where and to whom products will be marketed, no discussion of challenges.	Does not state where and to whom products will be marketed, no discussion of challenges.
Q5: What additional resources will be needed?	Specifically discusses what additional equipment, capital and human resources will be needed to implement plan. Incorporates	Specifically discusses equipment, capital and human resource needs, with some minor gaps.	Specifically discusses equipment, capital and human resource needs, with some major gaps.	Does not discuss resources needed to implement plan.

	observations from class or personal experience.			

SUSTAINABLE AGRICULTURE
UNDERGRADUATE CURRICULUM

Administered within the Individualized Programs Major, College of Agriculture

DEPT.	COURSE	DESCRIPTION	CREDITS
GENERAL EDUCATION REQUIREMENTS			
I. INTELLECTUAL INQUIRY –Arts and Creativity: Three hours from approved list			3
II. INTELLECTUAL INQUIRY - Humanities: Three hours from approved list			3
III. INTELLECTUAL INQUIRY - Social Sciences: CLD 102 or SOC 101 (satisfies Pre-Major requirement)			3
IV. INTELLECTUAL INQUIRY – Natural, Physical and Mathematical Sciences: Three hours from approved list			3
V, VI. COMPOSITION AND COMMUNICATION I and II: CIS 110 or WRD 110 *and* CIS 111 or WRD 111			6
VII. QUANTITATIVE REASONING - Quantitative Foundations: MA 123 or PHI 120 (satisfies Pre-Major requirement)			3
VIII. QUANTITATIVE REASONING - Statistical Inferential Reasoning: STA 210 (satisfies Pre-Major requirement)			3
IX. CITIZENSHIP - Community, Culture and Citizenship in the United States: Satisfied by GEN 100 or SOC 360			3
X. CITIZENSHIP - Global Dynamics: Satisfied by SAG 201			3
		SUB-TOTAL	**30**
COLLEGE OF AGRICULTURE REQUIREMENT			
GEN	100	Issues in Agriculture (Satisfies Gen Education VIII)	-
PRE-MAJOR REQUIRMENTS			
These are CLD 102 *or* SOC 101; MA 123 *or* PHI 120; STA 210 *and* the following courses:			
ECO	201	Principles of Economics I	3
CHE	104	Introductory General Chemistry	3
CHE	108	Intro to Inorganic, Organic, and Biochemistry	3
BIO	148	Principles of Biology I	3
BIO	152	Principles of Biology II	3
NFS	212	Introductory Nutrition	3
		SUB-TOTAL	**18**
MAJOR REQUIREMENTS			
Environmental Stewardship Cluster			
ASC	382	Principles of Livestock Production	3
ENT	300	General Entomology	3
PLS	366	Fundamentals of Soil Science	4
PLS	404	Integrated Weed Management	4
PPA	400G	Principles of Plant Pathology	3
Economic Profitability Cluster			
AEC	302	Agricultural Management Principles	4
AEC	305	Food and Agricultural Marketing Principles	3
AEC	445G	Introduction to Resource and Environmental Economics	3
Social Responsibility Cluster			
PHI	336	Environmental Ethics	3
SOC	360	Environmental Sociology (Satisfies Gen Education VIII)	3
SOC	420 *or* 517	Community Analysis *or* Rural Sociology	3
		SUB-TOTAL	**36**
SUSTAINABLE AGRICULTURE CORE			
SAG	101	Introduction to Sustainable Agriculture	3
SAG	201	Cultural Perspectives on Sustainability (Satisfies Gen Education IX)	-
SAG	386	Plant Production Systems	4
GEN	300	Agroecology	3
SAG	397	Apprenticeship in Sustainable Agriculture	3
SAG	490	Integration of Sustainable Agriculture Principles	3
		SUB-TOTAL	**16**
SPECIALTY SUPPORT			
Courses chosen in consultation with academic advisor			18
		SUB-TOTAL	**18**
FREE ELECTIVES			
As needed to achieve at least 121 credit hours		**SUB-TOTAL**	**3**

TOTAL CREDITS FOR B.S. DEGREE	121

Minor in Sustainable Agriculture

Overview. A goal of the Sustainable Agriculture undergraduate program is engagement of students from *non*agricultural backgrounds. The intent of the Minor is to expose such students to (i) basic principles in sustainable agriculture; (ii) experience in the operation of a sustainable farm operation; and (iii) the three pillar sustainability framework. Students from a wide variety of majors can benefit from the Minor. For instance, students interested in environmental law, natural resource management, civil engineering, and even literature studies could integrate sustainable agriculture principles into their major area of study.

Requirements. The Minor is structured on core courses in sustainable agriculture and three sustainability clusters described in the sustainable agriculture program. Specifically, SAG 101 and 201 will provide minor students with a firm introduction to sustainable agriculture. Students in the minor will also be required to participate in the operation of a student-run sustainable farm enterprise (SAG 397), thus gaining valuable experiential knowledge. Students will also be required to take one of several selected courses from each of the sustainability Clusters. Based on the pre-requisites of these courses, the minor pre-requisite will be ECO 201. Students who enroll in PLS 366 will first need to complete CHE105 (or

DEPT.	COURSE	DESCRIPTION	CREDITS
Minor Prerequisite			
ECO	201	Principles of Economics I	3
		SUB-TOTAL	**3**
Sustainable Agriculture Core (all courses required)			
SAG	101	Introduction to Sustainable Agriculture	3
SAG	201	Cultural Perspectives on Sustainability	3
SAG	397	Apprenticeship in Sustainable Agriculture	3
		SUB-TOTAL	**9**
Environmental Stewardship Cluster (select one)			
GEO	210	Pollution Hazards and Environmental Management	3
GLY	210	Habitable Planet: Earth Systems Evolution	3
PLS	366 [a]	Fundamentals of Soil Science	4
		SUB-TOTAL	**3-4**
Economic Profitability Cluster (select one)			
AEC	302 [b]	Agricultural Management Principles	4
AEC	305 [b]	Food and Agricultural Marketing Principles	3
AEC	445G [b]	Introduction to Resource and Environmental Economics	3
		SUB-TOTAL	**3-4**
Social Responsibility Cluster (select one)			
SOC 360 [c]		Environmental Sociology	3
GEN 501 [d]		Agricultural and Environmental Ethics	3
		SUB-TOTAL	**3**
		TOTAL CREDITS FOR MINOR	**21-23**

obtain the consent of the instructor) and those wishing to take GEN 501 will need to have senior standing.

[a][a]Prerequisite: CHE 105 or CHE 104 , [b]Prerequisite: ECO 201
[c]Prerequisite: SOC 101 or ACE 102. , [d]Prerequisite: Senior standing.

UNIVERSITY OF KENTUCKY
College of Agriculture

Sustainable Agriculture Program

Plan of Study

Revised March 2011 (UK Core Version)

Name _____

Student # _____ Date _____

Expected Graduation Date _____

UK Core

Intellectual Inquiry in Arts and Creativity

Three hours from the approved course list

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Intellectual Inquiry in the Humanities

Three hours from the approved course list

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Intellectual Inquiry in the Social Sciences

SOC 101 ***or*** CLD 102
(Satisfies Pre-Major Requirement)

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Intellectual Inquiry in the Natural, Physical and Mathematical Sciences

Three hours from the approved course list

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Composition and Communication I
CIS 110 ***or*** WRD 110

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Composition and Communication II
CIS 111 ***or*** WRD 111

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Quantitative Foundations
MA 123 **or** PHI 120
(Satisfies Pre-Major Requirement)

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Statistical Inferential Reasoning
STA 210 (Satisfies Pre-Major Requirement)

Course No. ***Credit*** ***Semester*** ***Grade***

STA 210 3

Community, Culture and Citizenship in the USA
GEN 100 or SOC 360

Course No. ***Credit*** ***Semester*** ***Grade***

_____

Global Dynamics
SAG 201

Course No.	*Credit*	*Semester*	*Grade*

Foreign Language Requirement
Two credits of high school or 6 hours of college level in a single language

College Requirements

General Agriculture (3 hours)
Either GEN 100 (freshmen only) or GEN 200

Course No.	*Credit*	*Semester*	*Grade*

Departmental Requirements

Pre-Major Requirements (18 hours)

Course No.	*Credit*	*Semester*	*Grade*
MA 123 **or** PHI 120 **and** STA 210*			
BIO 148	3		
BIO 152	3		
CHE 104	3		
CHE 108	3		
ECO 201	3		
NFS 212	3		
CLD 102 **or** SOC 101*			

* Counted in USP requirements

Major Requirements (36 hours)

Course No.	*Credit*	*Semester*	*Grade*
Environmental Stewardship Cluster			
ASC 382	3		
ENT 300	3		
PLS 366	4		
PLS 404	4		
PPA 400G	3		
Economic Profitability Cluster			
AEC 302	4		
AEC 305	3		
AEC 445G	3		
Social Responsibility Cluster			
PHI 336	3		
SOC 360	3		
SOC 420 **or** SOC 517	3		

Sustainable Agriculture Core Courses (16 hours)

Course No.	*Credit*	*Semester*	*Grade*
SAG 101	3		
SAG 201	3		
SAG 386/PLS 386 GEN 300 (Agroecology)	4 3		
SAG 397	3		
SAG 490	3		

*Specialty Support Requirements*** (18 hours)

Course No.	*Credit*	*Semester*	*Grade*

_____

_____

_____

_____

**All specialty support courses must be at or above the 200 level and approved by the academic advisor.

Electives *(As needed to achieve 121 hours total)*

Course No. Credit Semester Grade

_____

_____

_____

_____

Total Credit Hours _____
(121 minimum)

Total Hours 300 level & above _____
(45 minimum)

Student
Signature
_____

Advisor
Signature
_____

Director of Undergraduate
Studies Signature
_____

Reviewed by
Associate Dean's Office
_____

Sustainable Agriculture Curriculum Schedule Plan

Administered within Individualized Programs Major, College of Agriculture

FALL SEMESTER		
Year 1		
Course No.	*Description*	*Credits*
	Sub-total	
Year 2		
Course No.	*Description*	*Credits*
	Sub-total	
	Year 3	
Course No.	*Description*	*Credits*

	Sub-total	
	Year 4	
Course No.	*Description*	*Credits*
	Sub-total	

SPRING SEMESTER		
Year 1		
Course No.	*Description*	*Credits*
	Sub-total	
Year 2		
Course No.	*Description*	*Credits*
	Sub-total	
	Year 3	
Course No.	*Description*	*Credits*

	Sub-total	
	Year 4	
Course No.	*Description*	*Credits*
	Sub-total	

Summer Plans***

Year 1: _____

_____

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Year 2: _____

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Year 3: _____

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***Students should plan on completing the SAG 397: Apprenticeship in Sustainable Agriculture during one summer, and plan for additional internships, experiential learning, study abroad or other career-building work opportunities during other summer breaks.

Sustainable Agriculture Curriculum Scheduling Guide

The following are notes regarding courses to aid in your course of study planning. They include pre-requisites and guidelines for when students usually fit these into their SAG program. Please see the "Suggested Schedule" for an example schedule plan on the next page.

SAG Core Courses

SAG 101(Introduction to Sustainable Agriculture) - Generally taken as early in a student's SAG career as possible. No pre-requisites, offered Fall Semester only.

SAG 201(Cultural Perspectives on Sustainability) - Fulfills the Graduate Writing Requirement (GWR) and the new Global Dynamics General Education Requirement. To complete this course for GWR credit, a student must have completed the Freshman Writing Requirement (ENG 104 **or** equivalent), **and** have completed 30 hours prior to enrolling in the class.

SAG 386/PLS 386 (Plant Production Systems) – Offered Fall Semester only. Prerequisite: PLS 366 (**or** taken concurrently, **or** with permission of instructor).

SAG 397 (Apprenticeship in Sustainable Agriculture) – The Apprenticeship is officially scheduled on a student's Fall Semester; however, work is generally completed the previous summer, and into the Fall as necessary. Students should be prepared to independently schedule 250 hours of applied field work and attend weekly seminars during the late spring and summer (times determined each semester). No prerequisites.

SAG 490 (Capstone in Sustainable Agriculture) – Ideally taken during the student's final Spring Semester. Students should plan on attending an out-of-state trip over Spring Break.

Agricultural Economics Courses

AEC 302 (Agricultural Management Principles) – Offered Spring and Fall Semesters. Prerequisite: ECO 201.

AEC 305 (Food and Agricultural Marketing Principles) – Offered Spring and Fall Semesters. Prerequisite: ECO 201.

AEC 445G (Introduction to Resource and Environmental Economics) – Offered Spring and Fall Semesters. Prerequisite: ECO 201 **or** consent of instructor.

Chemistry Courses

The CHE 104/108 sequence is required for the SAG major, and is equivalent to a prior requirement of CHE 105. Students who may be interested in graduate study in the natural sciences are encouraged to take an additional semester of General Chemistry (CHE 107) with laboratory.

CHE 104 (Introductory General Chemistry) - Offered Fall and some Spring Semesters. Not open to students who have already completed both CHE 105 and 107. Prerequisite: Two years of high school algebra **and** Math ACTE of 19 or above (or Math placement test), **or** completion of MA 108R or a higher level math course.

CHE 108 (Introduction to Inorganic, Organic and Biochemistry without Laboratory) – Offered Spring and some Fall Semesters. Not open to students who have already completed CHE 105 **and** 107 **or** CHE 106. Prerequisite: CHE 104 **or** the KCTCS course CHM 100.

Plant and Soil Science Courses

PLS 366 (Fundamentals of Soil Science) – Offered Spring and Fall Semesters. Prerequisite: CHE 104.

PLS 404 (Integrated Weed Management) – Offered Spring Semester only. Prerequisite: PLS 386.

Biology Courses

BIO 148 (Principles of Biology I) – Offered Spring and Fall Semesters. Prerequisites: CHE 104 **or** Math ACTE of 26 or above **and** enrolled in CHE 104 concurrently.

BIO 152 (Principles of Biology II) - Offered Spring and Fall Semesters. Prerequisites: CHE 104 **or** Math ACTE of 26 or above **and** enrolled in CHE 104 concurrently.

Sustainable Agriculture Curriculum Scheduling Guide (con't.)

Nutrition and Food Science Courses

NFS 212 (Introductory Nutrition) – Offered Spring and Fall Semesters. Prerequisites: BIO 152 **and** CHE 104 **or** 108, may be taken concurrently.

Entomology Courses

ENT 300 (General Entomology) – Offered Fall Semester only. Prerequisites: BIO 148 **or** BIO 152.

Plant Pathology Courses

PPA 400G (Principles of Plant Pathology) – Offered Fall Semester only. Prerequisites: BIO 148 **or** BIO 152.

Sociology Courses

SOC 360 (Environmental Sociology) – Offered Spring and Fall Semesters. Prerequisite: SOC 101 **or** CLD 102.

SOC 420 (Sociology of Communities) – Offered Spring and Fall Semesters. Prerequisite: SOC 101 **or** CLD 102.

Student Evaluations for Sustainable Agriculture Courses 2007-2011

SAG 101: Introduction to Sustainable Agriculture

Semester	Students (N)	Course Mean	Teaching Mean
Spring 2007	8	3.3	3.4
Fall 2007	10	3.4	3.3
Spring 2008	6	3.5	3.8
Fall 2008	11	3.8	3.7
Spring 2009	11	3.7	3.6
Fall 2009	13	4.0	4.0
Fall 2010	14	3.7	3.9
Spring 2011	18	3.7	3.7

SAG 201: Cultural Perspectives on Sustainability

Semester	Students (N)	Course Mean	Teaching Mean
Spring 2008	9	2.8	2.7
Spring 2009	9	2.8	2.5
Spring 2010	15	3.5	3.8
Spring 2011	21	3.9	3.9

SAG 386: Sustainable Plant Production Systems

In 2007 and 2008 this course was taught by Tim Phillips and Mark Williams, and the ratings are listed in that order.

In 2009-2011 this course was taught by Krista Jacobsen and Mark Williams, and the ratings are listed in that order.

Semester	Students (N)	Course Mean	Teaching Mean
Fall 2007	1*	3.0, 3.0	3.1, 3.0
Fall 2008	15	2.6, 2.6	2.8, 3.1
Fall 2009	18	3.2, 3.2	3.2, 3.3
Fall 2010	34	3.6, 3.6	3.8, 3.8
Fall 2011	33	4.0, 4.0	4.0, 4.0

*** Only 1 student was reported as filling out the evaluations for unknown reasons.**

SAG 397: Apprenticeship in Sustainable Agriculture

Due to the nature of this class finishing off cycle for the normal school year numerical evaluations have not been tabulated. Additionally evaluations are only done in classes with more then 5 students and this apprenticeship has typically had student numbers below that. There have been student comments collected for this class and they have been extremely positive.

SAG 490: Integration of Sustainable Agriculture Principles

Semester	Students (N)	Course Mean	Teaching Mean
Spring 2009	6	4.0	4.0
Spring 2010	NA	NA	NA
Spring 2011	4	4.0	4.0

In 2010 evaluations were not reported by the office of Institutional Research, Planning, and Effectiveness although they were taken.

GEN 300: Agroecology

Semester	Students (N)	Course Mean	Teaching Mean
Fall 2010	14	3.8	3.9
Spring 2011	14	3.8	3.8

Mark A. Williams

Curriculum Vitae

I. Education

- Doctor of Philosophy, Developmental and Cell Biology, University of California, Irvine, 1998. Dissertation Title: RNA Editing Site Recognition in Plant Mitochondria.

- Bachelor of Science, School of Biological Sciences, University of Kentucky, 1989. Major: Botany.

II. Professional Employment

- Associate Professor - Department of Horticulture, University of Kentucky. January 1, 2007-present.

- Assistant Professor - Department of Horticulture, University of Kentucky. January 1, 2001-December 31, 2006.

- Post-Doctoral Scholar - Department of Horticulture, University of Kentucky. August 1999-December 2000.

- Post-Doctoral Scholar - Department of Developmental and Cell Biology, University of California, Irvine. August 1998 -July 1999.

- Lecturer - Department of Developmental and Cell Biology, University of California, Irvine. August 1998-June 1999.

III. Honors and Awards

- NACTA (North American Colleges & Teachers of Agriculture) Teacher Fellow Award. June 2009.

- Finalist, 2006 University of Kentucky Provost's Award for Outstanding Teaching.

- RNA Society Poster Award. Gordon Conference on RNA Editing. Ventura, California. 1999.

- Regents Dissertation Fellowship. University of California, Irvine. 1998.

- NIH Training Grant: Synthesis and Structure of Biological Macromolecules. University of California, Irvine. 1995-1997.

IV. Research Funding

Extramural Funding, Nationally Competitive

1. Incorporating Row Covers into Muskmelon IPM with a Farming Systems Approach. USDA Pest Management Alternatives Program. Multi-state project. Overall project PI: Mark Gleason, Iowa State University. University of Kentucky PI: **Mark Williams**, Co-PI: Tim Coolong, Co-PI: Ric Bessin. Total Project funding: $200,000. UK subcontract: $76,000 for three years starting September 2011.
2. Globalizing Agricultural Education: Sustainable Agriculture, Food and Rural Development. USDA/NIFA International Science and Education Competitive Grants. PI: Keiko Tanaka, Co-PI: **Mark Williams**, Co-PI: Beth Goldstein, Co-PI: Carol Hanley. $150,000. 2010-2013
3. Sustainable Systems for Cucurbit Crops on Organic Farms. USDA Organic Agriculture Research and Extension Initiative. This is a multi-state project. Overall project PI: Mark Gleason, Iowa State University. University of Kentucky PI: **Mark Williams**, Co-PI: Tim Coolong, Co-PI: Ric Bessin. Total Project funding: $1,047.024. UK subcontract: $276,448 for three years starting July 2009.

4. A Training Program in Sustainable Vegetable Production for Extension Personnel in Kentucky and Tennessee. USDA Southern SARE Professional Development Program. PI: Timothy Coolong, Co-PI: **Mark Williams**, Co-PI: Kenny Seebold, Co-PI: Ricardo Bessin, Co-PI: Annette Wszelaki (University of Tennessee), Co-PI: Michael Bomford (Kentucky State University). $59,532 for 1 year starting July 2010.

5. Engaging Agricultural and Non-Agricultural Students in an Interdisciplinary Curriculum for Sustainable Agriculture. United States Department of Agriculture - Higher Education Challenge Grants Program. PI: **Mark Williams**, Co-PI: Mike Mullen, Co-PI: Larry Grabau, Co-PI: Victoria Bhavsar. $141,274 for 3 years, starting July 2005.

6. Chloroplast-Localized N-Terminal Protein Processing by Peptide Deformylase. National Science Foundation. PI: Lynnette Dirk, Co-PI: **Mark Williams**, Co-PI: Robert Houtz, Co-PI: Anne Francis-Miller. $300,000 for 3 years, starting January 2003.

Extramural Funding, Regionally Competitive

1. Optimizing No-Till Vegetable Production Systems for Organic Growers. PI: Krista Jacobsen, Co-PI: Tim Coolong, Co-PI: **Mark Williams**. Kentucky Department of Agriculture Specialty Crops Block Grant Organic Pest Management Program. $20,000. 2010-2012.
2. Optimizing Orchard Management Strategies for Yield, Plant Health, and Fruit Quality in Organic Apple Production. PI: Doug Archbold, Co-PI: **Mark Williams,** Co-PI: John Strang, Co-PI: Ric Bessin. Kentucky Department of Agriculture Specialty Crops Block Grant Organic Pest Management Program. $73,425. 2010-2012.

3. Developing Diversified High Tunnel Systems to Enhance Food Security and Specialty Crop Production in Kentucky. PI: Krista Jacobsen, Co-PI: Tim Coolong, Co-PI: **Mark Williams.** Kentucky Department of Agriculture Specialty Crops Block Grant Program. $62,834. 2011-2013.
4. Isolation and Identification of Plant-Specific Peptide Deformylase Inhibitors from Soil Microorganisms for Use as Broad-Spectrum Herbicides and Selectable Markers. Kentucky Science and Engineering Foundation. PI: Robert L. Houtz, Co-PI: **Mark A. Williams**, Co-PI: Robert B. Grossman, Co-PI: Elisa M. D'Angelo, Co-PI: David W. Rodgers. $19,976. 2007-2009.
5. Database Design and Usability Testing for Advanced Digital Information Systems in Horticulture. Kentucky Science and Technology Corporation. PI: **Mark Williams**. $269,018 for 22 months, starting November 2002.
6. Fostering Research in Teaching and Learning in Sustainable Agriculture. Kentucky EPSCoR Conference Award. Kentucky Council on Post-Secondary Education. PI: Krista Jacobsen, Co-PI: Mark Williams. $2,665. 2011.

Extramural Funding, Internally Competitive

1. Developing an Optimized Organic Production System to Control Cucumber Beetles in Cucurbits. USDA Special Grant: New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Tim Coolong, Co-PI: Ric Bessin, Co-PI: Paul Vincelli. $55,000 for 3 years, starting July 2008.
2. Developing an Optimized Production System for Fresh Market Sweet Onion Production in Kentucky. USDA Special Grant: New Crops Opportunity Center, University of Kentucky. PI: Tim Coolong, Co-PI: **Mark Williams**. $33,107 for 3 years starting June 2009
3. Organic Grape Production for Kentucky. USDA Special Grant: New Crops Opportunity Center, University of Kentucky. PI. Patsy Wilson, Co-PI Krista Jacobsen, Co-PI: **Mark Williams**. $20,000 for three years staring June 2011.
4. Developing Optimized Organic Production Systems for Leafy Greens in Kentucky. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Brent Rowell. $17,000 for 3 years, starting June 2006.
5. Evaluation of Natural Sprays for Control of Economically Important Foliar and Fruit Diseases of Tomato and Cucurbits. New Crops Opportunity Center, University of Kentucky. PI: Paul Vincelli, Co-PI: **Mark Williams**, Co-PI: Ric Bessin, Co-PI: Kenny Seebold. $23,667. 2009-2012.
6. Sustainable/Organic Production Systems. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Krista Jacobsen. $50,003. 2010-2011.
7. Isolation and Identification of Plant-Specific Peptide Deformylase Inhibitors from Soil Microorganisms for Use as Broad-Spectrum Herbicides and Selectable Markers. University

of Kentucky Natural Products Alliance PI: Robert L. Houtz, Co-PI: **Mark A. Williams**, Co-PI: Robert B. Grossman, Co-PI: Elisa M. D'Angelo, Co-PI: David W. Rodgers. $37,500 for 1 year, starting January 2007.

8. Organic Apple Orchard Establishment. New Crops Opportunity Center, University of Kentucky. PI: Douglas Archbold, Co-PI: **Mark Williams**, Co-PI: John Strang, Co-PI: John Hartman, Co-PI: Paul Vincelli, Co-PI: Ric Bessin. $48,800 for 2years, starting April 2007.

9. Evaluating the Sustainability of Two Widely Used Organic Vegetable Production Systems and Their Potential Use in Kentucky. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Brent Rowell, Co-PI: Elisa D'Angelo, Co-PI: Mike Bomford (Kentucky State University). $70,719 for 3 years, starting June 2005.

10. Developing an Organic Farming Research and Education Center: An Experiential Learning Opportunity. Barnhart Fund for Excellence, University of Kentucky. PI: **Mark Williams**. $500 for 1 year, starting January 2005.

11. Evaluating Crop and Soil Fertility Changes during Transition to an Organic Vegetable Production System. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Brent Rowell, Co-PI: Mike Mullen. $71,000 for 3 years, starting August 2004.

12. Understanding the Efficacy of and Improving Tolerance to Peptide Deformylase Inhibitors in Transgenic Tobacco. Kentucky Tobacco Research Development Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Lynnette Dirk. $109,041 for 2 years, starting July 2004.

13. Development of Organic Production Systems for Horticultural Crops in Kentucky. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Brent Rowell. $70,039 for 3 years, starting August 2003.

14. Evaluation of Cultural Practices for Container Production of Tropical Flowering Woody Vines in Kentucky. New Crops Opportunity Center, University of Kentucky. PI: **Mark Williams**, Co-PI: Robert Geneve. $69,020 for 3 years, starting August 2002.

15. Peptide Deformylase in Tobacco: A Novel Herbicide Target Amenable to Genetically Engineered Tolerance. Tobacco and Health Research Institute, University of Kentucky. PI: **Mark Williams**, Co-PI: Robert Houtz, Co-PI: Lynnette Dirk. $102,000 for 2 years, starting July 2001.

16. Comparative Horticultural Performance of Serviceberry (*Amelanchier* sp.) cultivars in Kentucky. University of Kentucky Nursery/Landscape Fund. PI: **Mark Williams**. $4,000 for 2 years, starting June 2003.

17. Examination of Herbicide/Mulch Interactions in Landscape Plantings. University of Kentucky Nursery/Landscape Fund. PI: **Mark Williams**, Co-PI: Robert McNiel. $3,500 for 2 years, starting June 2001.

18. Evaluation of Cultural Practices for Container Production of Passion Flowers. University of Kentucky Nursery/Landscape Fund. PI: **Mark Williams**, PI: Robert Geneve. $1,000 for 1 year, starting May 2001.

Non-competitive Funding

1. Examination of Herbicide/Mulch Interactions in Landscape Plantings. Syngenta Crop Protection. PI: **Mark Williams**. $3,000 for 2 years, starting June 2001.

2. Comparative Horticultural Performance of Serviceberry (Amelanchier sp.) Cultivars in Kentucky. University of Kentucky Nursery/Landscape Fund. PI: Mark Williams. $4,000 for 2 years, starting June 2003.

Hatch Funding

1. Peptide Deformylase: A Novel Herbicide Target Amenable to Genetically Engineered Tolerance. PI: **Mark Williams**. United States Department of Agriculture Cooperative State Research Education and Extension Service - Hatch Project. Funding period: October 2002 – September 2007.

2. Developing Optimized Organic Production Systems for Cucurbits and Apples. PI: **Mark Williams**. United States Department of Agriculture Cooperative State Research Education and Extension Service - Hatch Project. Funding period: October 2008-2013.

V. Patents

1. US Patent Number 7,745,693. Inhibitors of Plant Peptide Deformylase for Use as Broad-Spectrum Herbicides and Method for Identifying the Same. Inventors: Robert L. Houtz, Lynnette M.A. Dirk and **Mark A. Williams**. Issued June 29, 2010.

2. US Patent number 7,445,923. Crystallization and Structure of a Plant Peptide Deformylase. Inventors: Robert L. Houtz, David Rodgers, Lynnette M.A. Dirk, and **Mark A.Williams**. Issued November 4, 2008.

3. US Patent Number 7,419,815 B2. Inhibitors of Plant Peptide Deformylase for Use as Broad-Spectrum Herbicides and Method for Identifying the Same. Inventors: Robert L. Houtz, Lynnette M.A. Dirk and **Mark A. Williams**. Issued September 2, 2008.

VI. Publications

Peer Reviewed Journal Articles

1. Mark Keating, Victoria Bhavsar, Herbert Strobel, Larry Grabau, Michael Mullen, **Mark Williams.** 2010. Engaging Agriculture and Non-Agriculture Students in an Interdisciplinary Curriculum for Sustainable Agriculture. *NACTA Journal*. Vol. 54 (4) pp 24-29.

2. Dirk, M. A., Schmidt, J., Cai, Y., Barnes, J., Hanger, K., **Williams, M**., Grossman, R., Houtz, R., Rodgers, D. 2008. Insights into substrate specificity of plant peptide deformylase, an essential enzyme with potential for the development of novel biotechnology applications in agriculture. *Biochemical Journal.* Vol. 413(3): 417-427.

3. Derek Law, John Snyder, **Mark Williams.** 2008. Evaluating Solarization and Cultivated Fallow for Johnsongrass (Sorghum halapense) Control and Nitrogen Cycling on an Organic Farm. *Biological Agriculture & Horticulture.* Vol. 26(2): 175-191.

4. **Mark Williams**. 2007. Global Development of Organic Agriculture. Book Review. *Crop Science*, Vol 47. 428-428

5. Cai-Xia Hou, Lynnette M. Dirk, Sitakanta Pattanaik, Narayan C. Das, Indu B. Maiti, Robert L. Houtz and **Mark A. Williams.** 2007. Plant Peptide Deformylase: A Novel Selectable Marker and Herbicide Target Based on Essential Co-Translational Protein Processing. *Plant Biotechnology Journal.* Vol. 5(2): 275-281. *Cover Article*.

6. Cai-Xia Hou, Lynnette M. Dirk and **Mark A. Williams**. 2006. Metabolism of the Peptide Deformylase Inhibitor Actinonin in *Nicotiana tabacum*. *WeedScience*. Vol. 54(2): 246-254.

7. Derek Law, John Snyder, Brent Rowell and **Mark A. Williams**. 2006. Weed Control Efficacy of Organic Mulches in Two Organically-Managed Bell Pepper Production Systems. *HortTechnology*. Vol. 16(2): 225-232.

8. Stephen Berberich, John Snyder, Robert Geneve and **Mark Williams**. 2006. Growth and Flowering Response of Container Grown Passion Flower Cultivars to Fertilizer and Paclobutrazol. *Journal of Environmental Horticulture*. Vol. 24(2) 109-114.

9. Cai-Xia Hou, Lynnette M.A. Dirk and **Mark A. Williams.** 2004. Inhibition of peptide deformylase leads to a decrease of D1 protein synthesis and a disassembly of PSII complexes in *Nicotiana tobacum. The American Journal of Botany*. 91 (9): 1304-1311.

10. Randy D. Dinkins, Heather M. Conn, Lynnette M.A. Dirk, **Mark A. Williams** and Robert L. Houtz*. 2003. The *Arabidopsis thaliana* peptide deformylase 1 protein is localized to both mitochondria and chloroplast. *Plant Science*. 165:751-758.

11. . Lynnette M.A. Dirk, **Mark A. Williams** and Robert L. Houtz. 2002. Specificity of Chloroplast-Localized Peptide Deformylases as Determined with Peptide Analogs of Chloroplast-Translated Proteins. *Archives of Biochemistry and Biophysics*. 406:135-141.

12. Lynnette M.A. Dirk, **Mark A. Williams** and Robert L. Houtz. 2001. Eukaryotic Peptide Deformylases: Nuclear-Encoded and Chloroplast-Targeted Enzymes in Arabidopsis. *Plant Physiology*. 127: 97-107. *This was a featured article.*

13. **Williams M.A.**, Yasuyo Johzuka and R. M. Mulligan. 2000. Addition of Nongenomically Encoded Nucleotides to the 3' Terminus of Maize Mitochondrial mRNAs: Truncated *rps12* mRNAs Frequently Terminate with CCA. *Nucleic Acids Research*. 28(22): 4444-51.

14. Mulligan R.M., **Williams M.A.** and M.T. Shanahan 1999. RNA Editing Site Recognition in Higher Plant Mitochondria. *Journal of Heredity*. 90(3): 338-344.

15. **Williams M.A.**, Tallakson W.A., Phreaner C.G. and R.M. Mulligan. 1998. Editing and Translation of Ribosomal Protein S13 Transcripts: Unedited Translation Products are not Detectable in Maize Mitochondria. *Current Genetics.* 34: 221-226.

16. **Williams M.A.**, Kutcher B.M. and R.M. Mulligan. 1997. Editing Site Recognition in Plant Mitochondria: The Importance of 5' Flanking Sequences. *Plant Molecular Biology* 36: 229-237.

17. Phreaner C.G., **Williams M.A.** and R.M. Mulligan. 1996. Incomplete Editing of *rps12* Transcripts Results in Polymorphic Gene Expression in Maize Mitochondria. *Plant Cell.* 8:107-117. *This was a featured article.*

Invited Book Chapter (Peer Reviewed)

1. Tanaka, K., **M. Williams**, K. Jacobsen, and M. Mullen. 2011. Sustainably Growing Farmers of the Future: Undergraduate Curriculum in Sustainable Agriculture at the University of Kentucky." In K. Bartels and K. Parker (eds.), *Teaching Sustainability and Teaching Sustainably in Higher Education*. Sterling, VA: Stylus Publishing.

2. **Mark Williams** and Audrey Law. 2008. Compost, Neem Oil, Pastured Poultry Production, and *Bacillus thuringiensis*. These sections were written for *The Encyclopedia of Organic, Sustainable and Local Food.* Duram, L (Ed.). Greenwood Press.

3. Cai-Xia Hou and **Mark A. Williams**. 2006. Actinonin-Induced Inhibition of Plant Peptide Deformylase: A Paradigm for the Design of Novel Broad-Spectrum Herbicides In *Natural Products for Pest Management.* Rimando, A.M.; Duke, S.O. (Eds.), *American Chemical Society Symposium Series*, 927:243-254.

Invited International Conference Proceedings

* denotes who made the presentation

1. **Mark A. Williams*** , Lynnette M. A. Dirk and Robert L. Houtz. 2002. Chloroplast-localized Peptide Deformylase: A New Target for the Development of Novel Broad-Spectrum Herbicides. 10th IUPAC International Congress on the Chemistry of Crop Protection. Basel, Switzerland. August 2002. p. 166.

2. Robert L. Houtz* , Lynnette M.A. Dirk, **Mark A. Williams** and Brent W. Meier. 2000. Primary and Secondary Structural Elements Influence the Susceptibility of the Rubisco Small Subunit to Methylation by Rubisco Small Subunit Methyltransferase. 5th International Jubilee Conference on the Role of Formaldehyde in Biological Systems: Methylation and Demethylation Processes. Sopron, Hungary. p. 31.

Conference Proceedings

1. Berberich, S* ., Geneve, R. and **M. Williams.** 2003. Growth and Flowering of Passion Flower Cultivars Varies in Response to Fertilizer Concentration. Southern Nursery Association Research Conference Proceedings. 48:103-106.

2. Berberich, S.* , **Williams, M.** and R. Geneve. 2002. The Effect of Fertilizer Concentration on Shoot Length, Biomass, and Flower Number in Container Produced Passion Flowers. Southern Nursery Association Research Conference Proceedings. 47:111-114.

3. **Mark A. Williams*** , Lynnette M. A. Dirk and Robert L. Houtz. 2002. Characterization and Inhibition of Chloroplast-localized Peptide Deformylases from *Arabidopsis thaliana.* Proceedings of the Southern Weed Science Society. p. 193.

4. **Williams, M.A**.* , Dirk, L.M.A. and R.L. Houtz. 2000. Characterization of a Chloroplast-Localized Peptide Deformylase from *Arabidopsis thaliana*. Plant Physiology. 123: S-131. Abstract.

Research Reports

1. Mark Williams and Delia Scott. 2011. The Impact of Row-Cover Placement for the Organic Production of Muskmelon and Butternut Squash in Kentucky. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-626). pp. 36-38.

2. Delia Scott, Mark Williams, Doug Archbold ad John Strang. 2010. Organic Apple Production Update. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-603). pp. 17-18.

3. Derek Law, Mark Williams and Timothy Coolong. 2008. Producing No-Till Pumpkins with a Rye/Vetch Cover-Crop in Kentucky with Conventional, Low-Input, and Organic Practices. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-572). pp. 51-53.

4. Derek Law and Mark Williams. 2008. Organic Small Fruit Production Using Haygrove Tunnels: Second-Year Update and Raspberry Production Yield Information. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-572). pp. 28-30.

5. Derek Law, John Strang, Amy Poston, John Snyder, Mark Williams, Chris Smigell, and Darrell Sloane. 2008. High Tunnel and Field Plasticulture Strawberry Evaluation. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-572). pp. 27-28.

6. Derek Law[§], and **Mark Williams**. 2007. Optimizing Organic Culture of Select Small Fruits in Kentucky Using Haygrove Tunnels. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-521). pp. 47-49.

7. Derek Law[§], John Strang, John Snyder, Chris Smigell, Darrell Sloane, and **Mark Williams**. 2007. High Tunnel and Field Plasticulture Strawberry Evaluation. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-521). pp. 46-47.

8. Derek Law[§], John Strang, Doug Archbold, and **Mark Williams**. 2007. Establishment of an Organic Apple Orchard at the UK Horticulture Research Farm. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-521). pp. 52-54.

9. Derek Law[§], and **Mark Williams**. 2007. Spring Greens and Lettuce Variety Evaluations. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-521). pp. 56-61.

10. Derek Law, Brent Rowell, John Snyder and **Mark Williams**. 2005. Solarization and Cultivated Fallow for Weed Control on a Transitioning Organic Farm. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-521). pp. 81-84.

11. S. Berberich, R. Geneve and **M. Williams**. 2004. Effect of Planting Date and Protective Structures on Finishing Date for Container-Produced Passiflora 'Lady Margaret". *University of Kentucky Nursery and Landscape Program* (PR-502). pp 9-10.

12. Derek Law, John Snyder, Brent Rowell and **Mark Williams**. 2004. Weed Control Management Systems for Organically Grown Bell Peppers. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-504). pp. 48-49.

13. Derek Law, Brent Rowell and **Mark Williams**. 2003. Development of Organic Production Systems for Kentucky Horticultural Crops. *University of Kentucky Fruit and Vegetable Crops Research Report* (PR-488). p. 94.

14. S. Berberich, R. Geneve and **M. Williams**. 2003. Pinching of Passiflora 'Lady Margaret' and 'Amethyst' Reduces Shoot Number and Delays Flowering. *University of Kentucky Nursery and Landscape Program* (PR-486). pp. 8-9.

15. S. Berberich, **M. Williams** and R. Geneve. 2002. Evaluation of Cultural Practices for Container Production of Passion Flowers. *University of Kentucky Nursery and Landscape Program Research Report* (PR-468). pp.12-13.

16. R. Geneve, **M. Williams** and S. Kester. 2001. Container Production of Passion Flower. *University of Kentucky Nursery and Landscape Program Research Report* (PR-450). pp. 10-11.

Abstracts Presented Before Professional Societies

* denotes who made the presentation

1. Minter, L*., and R Bessin, A. Alesch, D. Scott, **M. Williams**, T. Coolong, and D. Biddinger. ESA National Conference. Results of native pollinator diversity surveys on Kentucky vegetable farms. , 2011. Dec. 12-15, San Diego CA.

2. Shawn Lucas*, Elisa D'Angelo, **Mark Williams.** Soil Science Society of America. Organic Soil Amendments and their affect on Soil Microbial and Physical Properties. Long Beach CA. November 2010.

3. **Mark A. Williams**. 2008. Engaging Agriculture and Non-Agriculture Students in an Interdisciplinary Curriculum for Sustainable Agriculture. NACTA/SERD Conference. Logan UT, June 2008.

4. Cai-Xia Hou*, Lynnette M.A. Dirk and **Mark A. Williams.** Metabolism of the Peptide Deformylase Inhibitor Actinonin in *Nicotiana tabacum*. American Society of Plant Biologists Meeting. Seattle, WA. July 16- 20, 2005.

5. Derek Law*, Brent Rowell and **Mark Williams**. Weed Control Efficacy of Organic Mulches in Two Organically Managed Bell Pepper Production Systems. American Society of Horticultural Science National Meeting. Las Vegas, NV. July 18-21, 2005

6. Cai-Xia Hou*, Heather M. Conn, Lynnette M.A. Dirk, Robert L. Houtz and **Mark A. Williams**. Genetically Engineered Tolerance to a Peptide Deformylase Inhibitor in Tobacco. American Society of Plant Biologists Meeting. Lake Buena Vista, Florida. July 2004.

7. Mark **A. Williams**, Robert L. Houtz and Lynnette M.A. Dirk*. Peptide Deformylase: Site-Directed Mutation Directed Towards Engineering Inhibitor Resistance. American Society of Plant Biologists Meeting. Lake Buena Vista, Florida. July 2004.

8. **Mark A Williams***, Lynnette M. A. Dirk and Robert L. Houtz. Production of Transgenic Tobacco with Engineered Resistance to Inhibitors of Plant Peptide Deformylase. International Horticulture Congress. Toronto, Canada. August 2002.

9. Heather Conn*, Randy Dinkins, Lynnette Dirk, Robert Houtz and **Mark Williams**. Subcellular Localization of Plant Peptide Deformylase. Annual Society of Plant Biology Meeting. Denver, CO. August 2002.

10. R. L. Houtz, Dirk*, L.M.A. and **M.A. Williams**. Specificity of Chloroplast-localized Peptide Deformylases as Determined with N-Terminal Peptide Analogs of Chloroplast-Translated Proteins. Annual Society of Plant Biology Meeting. Denver, CO. August 2002.

11. **Mark A. Williams***, Lynnette M. A. Dirk and Robert L. Houtz. 2002. Chloroplast-localized Peptide Deformylase: A New Target for the Development of Novel Broad-Spectrum Herbicides. Weed Science Society of America Annual Meeting. Reno, NV. February 2002.

12. **Mark A. Williams***, Lynnette M. A. Dirk and Robert L. Houtz. 2002. Characterization and Inhibition of Peptide Deformylases from *Arabidopsis thaliana.* Southern Weed Science Society of America Annual Meeting. Atlanta, GA. January 2002.

13. **Mark A. Williams***, Lynnette M. A. Dirk and Robert L. Houtz. Characterization and Inhibition of Chloroplast-localized Peptide Deformylases from *Arabidopsis thaliana.* American Society of Horticultural Science Conference and Exhibition. Sacramento, CA. July 2001.

14. Lynnette M.A. Dirk*, **Mark A. Williams** and Robert L. Houtz. Post-Translational Modifications in the Rubisco SS: Influence of Methionines on the Methylatability of the N-Terminal α-Amino Group. Annual Society of Plant Physiology Meeting. San Diego, CA. July 2000.

15. **Williams, M.A.***, Dirk, L.M.A. and R. L. Houtz. Characterization of a Chloroplast-localized Peptide Deformylase from *Arabidopsis thaliana.* Annual Society of Plant Physiology Meeting. San Diego, CA. July 2000.

16. **Williams, M.A.***, Kutcher, B.M. and R.M. Mulligan. Identification of an Antisense RNA to the 5' Flanking Region of a Maize Mitochondrial Editing Site. Gordon Conference on RNA Editing. Ventura, CA. January 24-29, 1999.

17. **Williams, M.A.***, Kutcher, B.M. and R.M. Mulligan. Recombination Near Editing Sites Affects Editing Site Recognition. Gordon Conference on RNA Editing. Ventura, CA. January 19-24, 1997.

18. Mulligan, R.M.*, Phreaner, C.G., **Williams M.A.** and W. A. Tallakson. Incomplete Editing Results in Polymorphic Gene Expression in Plant Mitochondria. Gordon Conference on RNA Editing. Ventura, CA. January 19-24, 1997.

19. **Williams, M.A.***, Kutcher, B.M. and R. M. Mulligan. Recombination Near Editing Sites Affects Editing Site Recognition. UC Riverside Conference, January 16-18, 1997.

20. Mulligan, R.M.*, Phreaner, C.G., **Williams M.A.** and W. A. Tallakson. Incomplete Editing Results in Polymorphic Gene Expression in Plant Mitochondria. UC Riverside Conference, January 16-18, 1997.

21. Mulligan R.M.[*], Phreaner C.G., **Williams M.A.** and W. A. Tallakson. Incomplete Editing Results in Polymorphic Gene Expression in Plant Mitochondria. EMBO Workshop on RNA Editing. Maastricht, Netherlands. September 1996.

22. Phreaner C.G., **Williams M.A.** and R.M. Mulligan[*]. *rps12* in Maize Mitochondria: One Gene; Six Editing Sites; Many mRNAs; How Many Proteins? Plant Mitochondria; From Gene to Function. Duke University, NC. April 1995.

23. Phreaner C.G., **Williams M.A.** and R.M. Mulligan[*]. *rps12* in Maize Mitochondria: One Gene; Six Editing Sites; Many mRNAs; How Many Proteins? RNA Editing: An Evolving Mechanism of Gene Regulation at the 1994 Albany Conference. Rensselaerville, NY. October 1994.

VII. Invited Speaker Presentations

International

1. University of Development Studies, Tamale, Ghana Africa. *Sustainable Agriculture Education and Research at the University of Kentucky*. January 2011. Part of the Norman Borlaug Mentor Program.

2. Malang University, Malang, Indonesia. *Development of a Curriculum in Sustainable Agriculture at a United States Land Grant University*, Community Supported Agriculture June 2009.

3. Maejo University, Chiang Mai Thailand. *Sustainable Agriculture and International Internships at the University of Kentucky*. January 2008.

4. Slow Food Terra Madre International Meeting of Food Communities. *Development of a Novel Curriculum in Sustainable Agriculture at the University of Kentucky*. Torino, Italy. October 2006.

5. International Horticulture Congress Meeting. *Chloroplast-localized Peptide Deformylase: A New Target for the Development of Novel Broad-Spectrum Herbicides*. Toronto, Canada. August 2002.

National

1. TN Fruit and Vegetable Conference. *Organic Vegetable Production*. Jan. 21, 2011, Nashville, TN

2. Extension Agent training: Organic and Sustainable Vegetable Production: Weed Management, June 16, Lexington KY, Aug. 19, 2010. Knoxville, TN.

3. ASHS National Meeting, *Engaging Agriculture and Non-Agriculture Related Students in a Multidisciplinary Curriculum in Sustainable Agriculture*. St. Louis, MO. July, 2009

4. Southern SAWG General Conference. *Bettering Black Plastic: Alternative Practices for Reducing Negative Impacts*. Wilhoit, J., Coolong, T., and Williams, M., Jan. 23, 2009, Chattanooga, TN

5. TN Fruit and Vegetable Conference. *Organic Vegetable Production, Organic Weed Management*. Jan. 21, 2009, Nashville, TN

6. Texas A & M, College Station, Texas. *UK Sustainable Agriculture Curriculum: Development and Current Status.* February 2009.

7. UT Knoxville. Knoxville, TN. *UK Sustainable Agriculture Curriculum: Development and Current Status*. March 2009.

8. Southern Weed Science Society Annual Meeting – *Organic Weed Management Symposium. Evaluation of Weed Control Practices in an Organic Bell Pepper Production System*. Memphis, TN. January 27, 2004.

9. American Chemical Society Meeting – Natural Products for Pest Management Symposium. *Actinonin-Induced Inhibition of Plant Peptide Deformylase: A Paradigm for the Design of Novel Broad-Spectrum Herbicides*. Anaheim, CA. March 2004.

10. American Arboretum and Botanical Gardens Association Annual Meeting. *Database Design and Usability Testing for Advanced Digital Information Systems in Horticulture*. Boston, MA. June 2003.

Regional/Local

1. KY Healthy Food Local Farms Conference. *Trends in Sustainable Agriculture in Academic Institutions in Kentucky*. Plenary Panel Moderator. Louisville, KY. November 2011.

2. UK Final Word Seminar Series. *Sustainable Agriculture: The Final Word.* University of Kentucky. November 2011.

3. Girls STEM NSF Collaborative presentation. *Math in Agriculture*. Lexington. August 2010.

4. Keynote Panel Speaker: Campus Community Partnership for Sustainability. *The Future of Agriculture in Kentucky: A Vision of Sustainability.* Lexington, KY. April 2010.

5. Kentucky Environmental Educators Association Conference. *Using the Horticulture Research Farm as a Field Destination*. Shakertown, October 25, 2008.

6. Kentucky Slow Foods Association Annual Meeting. *Reflections on Terra Madre*. Woodford Reserve Distillery. January 13, 2007.

7. Growing Kentucky II Symposium. *Development of the UK Sustainable Agriculture Curriculum*. Lexington. March 13, 2007.

8. Kentucky Fruit and Vegetable Grower's Association Annual Meeting. *Northeast U.S. Commercial Organic Farming Update*. Lexington, KY. January 2006.

9. Live Television Presentation, WKYT. *Status of Organic Agriculture in Kentucky and in the UK College of Agriculture*. Lexington, KY. February 24, 2005.

10. Kentucky Landscape Industries 2005 Winter Trade Show and Conference. *Weed Management in Nursery and Landscape Plantings*. Louisville, KY. January 10, 2005.

11. Kentucky Landscape Industries 2004 Winter Trade Show and Conference. *Weed Management in Nursery and Landscape Plantings*. Louisville, KY. January 7, 2004.

12. Best Management Practices Workshop 4. *Mulch and Herbicides*. Princeton, KY. February 18, 2003.

13. Kentucky Landscape Industries 2003 Winter Trade Show and Conference. *The Biology and Control of Selected Landscape Weeds*. Louisville, KY. January 9, 2003.

14. Kentucky Landscape Industries 2002 Winter Trade Show and Conference. *The Biology and Control of Six Common Winter Annual Weeds.* Lexington, KY. January 10, 2002.

15. Kentucky Landscape Industries 2002 Winter Trade Show and Conference. *Herbicide/Mulch Interactions in Landscape Plantings*. Lexington, KY. January 10, 2002.

16. Turf and Landscape Management Short Course. *Herbicide/Mulch Interactions in Landscape Plantings*. Louisville, KY. February 21, 2002.

17. Kentucky Tobacco Research and Development Center. *Chloroplast-localized Peptide Deformylase: A New Target for the Development of Novel Broad-Spectrum Herbicides*. Lexington, KY. November 8, 2002.

18. Kentucky Landscape Industries 2001 Winter Trade Show and Conference. *The Biology and Control of Six Common Winter Annual Weeds*. Lexington, KY. January 5, 2001.

VIII. Service and Recognition

- Manuscript reviewer for The Journal of Soil Science, Horticulture Science, HortTechnology and Biological Agriculture and Horticulture.

- Co-organizer for the Sustainable Agriculture Education Association (SAEA) national meeting. This meeting was held at UK and attended by over 200 educators and students from across the United States and abroad. August 2011.

- Featured in the *UK at The Half* radio show. Interviewed by Carl Nathe to discuss the future of Kentucky Agriculture and how sustainability fits in. November 2010.

- Conference Steering/Planning Committee Member, Campus Community Partnership for Sustainability Conference. Lexington KY. 2010.

- Organized and lead the effort for the "2010 Chef's Afield Event" at the Organic Farming Research and Education Unit. October.

- Filmed for KET episode: "Chef's Afield and Sustainable Agriculture." October, 2010.

- Elected to the University Senate for a three-year term starting August 2009.

- Filmed for Gourmet Magazine's "Diary of a Foodie." This television show was internationally shown on the National Geographic Network and highlighted my philosophies on organic farming and the SAG curriculum. August 2007.

- Filmed for UK Extension on Air episodes: "Making Farming Tools of the Past, New Again," and "Community Supported Agriculture." October, September 2007.

- Organized and Hosted the 2006 "Chefs Afield" meeting at the University of Kentucky Horticulture Research Farm, October 2006.

- Established a committee to develop a local foods buying program for the University of Kentucky dining services. A pilot program occurred during Fall 2006 where several different produce items were purchased from local growers for a three month period. The program was successful and evolved into the current local foods buying program at the university, which is one of the largest in the United States.

- Featured in the Fall 2006 University of Kentucky College of Agriculture Magazine, "Sustainable Agriculture, So We Can Farm Forever."

- Member, grant review panel for the USDA - CSREES - Integrated Organic Program. Washington, D.C. August 2004. I was also invited to join the panel in 2005 but recused because I had a grant submitted to the program.

- Reviewer, Kentucky Tobacco Research and Development Center grant program, 2002 and 2005.

- Reviewer for the University of Kentucky, College of Agriculture Precision Resource Management Committee grant program, April 2004.

- Reviewer for the University of Kentucky, College of Agriculture Undergraduate Scholarships, 2003.

- Kentucky Arborist Association Education and Research Committee member. August 2004-present.

- Invited Judge for the 2002 Intel International Science and Engineering Fair, Weed Science Section. Louisville, KY. May 18, 2002.

- Invited Judge for the SCAPA Science Fair. Lexington, KY. February, 2008.

- Invited Judge for the Stonewall Elementary Science Fair. Lexington, KY. February 12, 2004.

IX. Research Advising

Graduate Student Advising

Major Advisor

1. Delia Scott, M.S. candidate, Plant and Soil Science Program. Project: Evaluating the Sustainability of Two Widely Used Organic Vegetable Production Systems and Their Potential Use in Kentucky. 2005-present.
2. Shawn Lucas, Ph.D. candidate, Crop Science Program. Project: Evaluation of Soil Microbial and Carbon Sequestration Parameters in Organically Managed Soils. August 2006-present.
3. Robert Caudle, Ph.D. candidate, Crop Science Program. Project: Developing an Optimized Organic Production System to Control Cucumber Beetles in Cucurbits. August 2008-present.
4. Stephen Berberich, M.S., Plant and Soil Science Program. Project: Evaluation of Cultural Practices for Container Production of Tropical Flowering Vines. Started August 2002. Graduated February 2005.
5. Derek Law, M.S.,Plant and Soil Science Program. Project: Development of Organic Production Systems for Horticultural crops in Kentucky. August 2003- Graduated April 2004.
6. Audrey Horrall, Ph.D. candidate, Plant and Soil Science Program. Project: Evaluation of Soil Biodiversity Changes in an Organic Production System. August 2003-Graduated December 2008.
7. Tony Silvernail, Ph.D. candidate, Plant and Soil Science Program. Project: Evaluation of Tillage Effects on Weed Seed Bank Changes in an Organic Production System. August 2003-July 2005 (withdrew for personal reasons).

Committee Member

1. Derrick Hammons, Ph.D. Entomology Program. Graduated October 2009.

2. Merari Feliciano-Rivera, Ph.D., Plant Pathology Program. Graduated May 2011

3. Amy Poston, M.S. , Plant and Soil Science Program. Graduated April 2007.

4. Marta Nosarzewski, Ph.D., Plant Physiology/Biochemistry/Molecular Biology Program. Graduated 2007.

5. Sowmya Sampath, Ph.D. Biochemistry Program. Graduated March 2008.

6. Kyung Myung, Ph.D. , Plant Physiology/Biochemistry/Molecular Biology Program. Graduated June 2007.

7. John Barnes M.S. Chemistry. Graduated June 2006.

8. Dan Kishnick, M.S. candidate, Plant and Soil Science Program. Graduated August 2005.

9. Elizabeth Bisby-Kuhn, M.S. candidate, Plant and Soil Science Program. 2003.

10. Todd Leeson, M.S. candidate, Plant and Soil Science Program. 2003-2004.

11. Brent Meier, Ph.D. candidate, Plant Physiology/Biochemistry/Molecular Biology Program. January 2001.

Other Graduate Advising

- Directed Jamie Dockery (M.S. candidate in Agriculture Education) in a PLS790 Independent Research project during the Spring 2008 semester.

- Directed three graduate students, Michael Hogan, Charlie Neal, and Delia Scott in PLS 790 Independent Research projects during the Fall 2006 semester.

Visiting Scholar Advising

- Directed and Advised Mildred Osei-Kwartang who was a Bourlag Institute Fellow from Ghana. Project: Post Harvest Handling of Organically Grown Sweet Potatoes. Summer-Fall 2009.

Post-Doctoral Scholars

- Major Advisor for Cai-Xia Hou, Ph.D. Project: Characterization and Inhibition of Chloroplast-Localized Peptide Deformylases. From the Department of Plant Physiology and Molecular Biology. University of Turku, Finland. March 1, 2002-June 2006.

X. Undergraduate Advising

Academic Advising

I advise undergraduate students in the Sustainable Agriculture, Agriculture Biotechnology and Horticulture Plant and Soil Science programs.

Undergraduate Research Advising

- Advised and mentored 3 students in Fall 2009 and 1 student in Fall 2010 on independent research projects (SAG 395) related to organic and sustainable farming.

- Advised and mentored Emily Brunner, an undergraduate in the Natural Resource Conservation Program. Project: Developing Precision Irrigation Systems for Organic Apple Orchards. Summer-Fall 2008.

- Advised and mentored Ben Abell, an undergraduate in the Natural Resource Conservation Program. Project: Evaluation of organic and conventional whole-farm management systems. Summer-Fall 2005.

- Advised and mentored Derrick Hammons, an undergraduate in the Plant and Soil Science Program. Project: Evaluation of early season organic cabbage production systems. Fall 2003-Spring 2004.

- Advised and mentored Brian Zamora, an undergraduate in the Agriculture Biotechnology program. Project: Construction and Evaluation of Transformed *Arabidopsis thaliana* Engineered for Resistance to Peptide Deformylase Inhibitors. Mr. Zamora was the recipient of two Undergraduate Research and Creativity Grants of $500 each during this project. January 2001- May 2002.

International Student Advising

- Advised and mentored 1 student from France, AgroSup Dijon (ENESAD), and 2 students from Meijo University in Thailand. These students all worked as Apprentices on our farm. 2009.

- Advised and mentored 1 student from Meijo University in Thailand. This student worked as Apprentices on our farm. 2010.

Other Advising

• Faculty Co-Advisor for 9 undergraduate students competing in the Associated Landscape Contractors of America (ALCA) Student Career Days. Columbus, OH. March 2004.

• Faculty Co-Advisor for 14 undergraduate students competing in the Associated Landscape Contractors of America (ALCA) Student Career Days. Jackson, Mississippi. March 2003.

• Faculty Co-Advisor for 14 undergraduate students competing in the Associated Landscape Contractors of America (ALCA) Student Career Days. Illinois Central College. Peoria, IL. March 20-24, 2002.

• Faculty Co-Advisor for the Horticulture Club Nursery/Arboreta tour in Oregon and Washington. March 8-17, 2002.

• Faculty Co-Advisor for 8 undergraduate students competing in the Associated Landscape Contractors of America (ALCA) Student Career Days. Colorado State University, Fort Collins, CO. March 8-11, 2001.

XI. Teaching and Instruction

Resident Instruction

- *PLS 404 - Integrated Weed Management, PLS 451 - Landscape Installation and Management, PLS 386 - Plant Production Systems, SAG 397 - Apprenticeship in Sustainable Agriculture, SAG 490 - Integration of Sustainable Agriculture Principles, SAG 395 - Independent Research in Sustainable Agriculture*

Teaching Improvement Activities

- Nominated to the college's Academy of Teaching and Learning (ATL) Scholars Program. January 2009-December 2010.

- Participated in the 2007 National Conference on Changing Higher Education in Agriculture and Related Sciences: From Dialogue to Action-Reinventing teaching and Learning. June 11-13, Texas A &M University.

- Participated in a workshop designed to teach instructors how to teach novel agriculture courses such as GEN 100 & 200. Workshop was facilitated by Dr. Larry Grabau of the Teaching and Learning Center. Course met weekly for 9 weeks during the fall semester, 2001.

- Participated in the 2006 Facilitating Sustainable Agriculture Education Conference. This conference was the first of its kind and was organized by faculty from the University of California Santa Cruz and University of California Davis. The conference was focused on developing resources for faculty involved in sustainable agriculture education. Asilomar, CA. January 2006.

Invited Teaching Related Presentations

- United States Department of Agriculture Southern Region Teaching Workshop, "Applying the Concepts of Sustainability in the Design and Construction of an Organic Farming Research and Education Center." Lexington, KY. August 10, 2005.

- NACTA-SERD Meeting, "Engaging Agriculture and Non-Agriculture Related Students in a Multidisciplinary Curriculum in Sustainable Agriculture" Logan, Utah. June 11-13, 2008

Other Teaching Related Activities

- Director of Undergraduate Studies for the Sustainable Agriculture Curriculum since its inception in Spring semester 2007.
- Co-lead week-long students trips to Los Angeles (8 students) in Fall 2007, New Mexico (10 students) in Spring 2008, and Arizona (8 students) in Spring 2009 to study sustainable agricultural systems and architecture.
- Co-lead an 18 day student trip to Thailand (11 students) in Summer 2008 as part of the UK education abroad program, and College of Agriculture Ambassador Program.
- Lead or Co-lead students on week –long organic farming and sustainable agriculture study tours to Upper North-East (6 students) in Spring 2011, Upper Mid-West (7 students) in Spring 2009, Southeast (5 students) in Spring 2010.
- Co-advisor: UK Slow Food Student Chapter. November 2010-present
- Committee member: College Undergraduate Curriculum Committee. Fall 2010-present.

XII. Committee Participation

National

- Sustainable Agriculture Education Association (SAEA) steering committee. 2006-2008.
- Sustainable Agriculture Education Association Conference Planning Committee. 2010-2011

State

- Education and Research Committee, Kentucky Arborist Association. August 2004-2006.
- Organic Certification Advisory Panel – Kentucky Department of Agriculture. January 2007-present.

University

- Co-Chair, President's Sustainability Advisory Committee. January 2008-2010.
- President's Sustainability Advisory Committee. January 2011-present.
- Sustainable Scholarly Learning Community Committee. 2009-2010.

College of Agriculture

- **Departmental:** Scholarship Committee (**Chair**), Undergraduate Education Committee, Graduate Studies Committee, Research Project Review Committee, Lexington Farm/Greenhouse Committee, Safety Committee.

- **College of Agriculture:** Sustainable Agriculture Curriculum Steering Committee (**Chair**), October 2005-2010. Associate Member in the Graduate Faculty for the Plant and Soil Science (M.S.) program, October 24, 2001-present. Associate Member in the Graduate Faculty for the Plant Physiology (Ph.D.) program, October 24, 2001-present. Associate Member in the Graduate Faculty for the Crop Science (M.S.) program, August, 2003-present.

XIII. Professional Development

I have made a concerted effort to expand my knowledge on all aspects of landscape management, with a particular emphasis on arboriculture. This information has allowed me to create a class focused on arboriculture (PLS451), and is used in many of my public presentations. As part of my self-edification in arboriculture, I obtained two of the highest internationally-recognized levels of achievement in arboriculture.

• International Society of Arboriculture (ISA) Certified Tree Worker/Climber Specialist. Obtained June 12, 2002.

• International Society of Arboriculture Certified Tree Worker Skills Exam Evaluator. Obtained June 12, 2002.

• Kentucky Arborist Association workshop “Evaluating Tree Defects.” Completed June 21, 2002.

• ArborMaster Training Climbing Skills Module. Completed July 13, 2002.

XIV. Professional Affiliations

• Member of the Botanical Society of America (2004-present), American Society of Horticultural Science (2001-2003), Kentucky Arborist Association (2004-present), Weed Science Society of America (2003) International Society of Arboriculture (2002-present) and North American Colleges and Teachers of Agriculture (2006 - 2010).

Krista Linnae Jacobsen

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PROFESSIONAL EXPERIENCE	Assistant Professor, Department of Horticulture, University of Kentucky *60% Research/40% Teaching*	**July 1, 2011 - present**
	Lecturer, Sustainable Agriculture Program, University of Kentucky	**2009 –2011**
	Postdoctoral Researcher, Department of Crop and Soil Sciences, The Pennsylvania State University	**2008-2009**
	Agroecology Program Recruiter, The Pennsylvania State University	**2008-2009**
EDUCATION	Ph.D. in Ecology, University of Georgia *Agroecology Laboratory, Odum School of Ecology*	**2008**
	B.S. in Biology, Virginia Tech *Summa cum laude with honors* *Minors: Horticulture, Chemistry*	**2001**

RESEARCH INTERESTS

My research program focuses evaluating sustainable agricultural systems from an interdisciplinary, systems perspective including effects on soil quality, plant productivity, and the economic, human labor and energy requirements in these systems. I work primarily in organic agronomic and horticultural cropping systems. Recent and current projects include:

- Developing conservation-tillage organic vegetable production systems,
- Evaluating new crops for organic production in Kentucky,
- Evaluating effects of alternative cover crop management in agronomic cropping systems
- Creating a high tunnel research facility focused on year-round diversified organic vegetable production in movable and non-movable high tunnels.

TEACHING EXPERIENCE:

CURRENT COURSES

Introduction to Sustainable Agriculture (SAG 101);

Cultural Perspectives on Sustainability (SAG 201);

Plant Production Systems (PLS 386, co-taught);

Agroecology (SAG 390, developed course)

TEACHING EXPERIENCE:

PAST COURSES

World Food Issues II: Your Daily Bread (HON 115)

Organic Farming Summer Intensive (PLS 597, developed course)

Organic Agriculture and the Ethics of Sustainability Maymester (University of Georgia, taught 5 years, co-developed course)

CURRENT SUPPORT

Extramural Research Funding

Jacobsen, K.L. (PI), T. W. Coolong (co-PI), & M.A. Williams (co-PI). Optimizing No-Till Vegetable Production Systems for Organic Growers. Kentucky Department of Agriculture Specialty Crops Block Grant Organic Pest Management Program. Funded, $20,000. 2010-2012.

Jacobsen, K.L. (PI), T.W. Coolong (co-PI) & M.A. Williams (co-PI). Developing Diversified High Tunnel Systems to Enhance Food Security and Specialty Crop Production in Kentucky. Kentucky Department of Agriculture Specialty Crops Block Grant Program. Funded, $62,834. 2011-2013.

New Crop Opportunities in Sustainable Organic Production. National Institute of Food and Agriculture. Williams, M.A. (PI) & K.L. Jacobsen (co-PI). Funded, $50,003. 2010-2011.

Wilson, P. (PI) & K. L. Jacobsen (co-PI). Organic Grape Production for Kentucky. Kentucky Department of Agriculture Specialty Crops Block Grant Organic Pest Management Program. Funded, $20,000. 2011-2013.

Teaching and Other Support

Jacobsen, K.L. (PI). Outreach Education Sponsorship for the 4th National Sustainable Agriculture Education Association Conference. Sustainable Agriculture Research and Extension (SARE). Funded, $5,000

Jacobsen, K.L., D. Parr, K. Niewolny. Supporting Education in Sustainable and Organic Agriculture: A Proposal to Fund the 4th National Sustainable Agriculture Education Association (SAEA) Conference. The Ceres Trust. Funded, $10,000.

Participant, Multistate Hatch Project No: SCC83 Quantifying the Linkages Among Soil Health, Organic Farming, and Food.

Proposals submitted

Tanaka, K. (PI), K. Jacobsen (co-PI), K. Niewolny (co-PI), S. Hodges (co-PI), M. Wilcox (co-PI), M. Velandia (co-PI), A. Wszelaki (co-PI) Mapping Sustainable Farm Systems: An Integrated Focus on Upper South New Producers as Catalysts of "Good Stewardship." Southern SARE Research and Education Proposal. Submitted, $299,329. 11/15/2011.

PRESENTATION OF RESEARCH	Jacobsen, K.L., C.F. Jordan, & C.S. Escalante. Turning red clay brown: The effects on soil quality and economic tradeoffs of restorative agricultural systems in the Deep South. 94th Annual Meeting of the Ecological Society of America. Albuquerque, NM. 4 August, 2009.	**2009**
	Welch-Devine, M.L., & K.L. Jacobsen. Traditional practices in changing times: a framework for understanding the impact of climate change, demographics and political uncertainty in Basque agricultural systems. (Poster). Agriculture, Food & Human Values Society Meeting. State College, PA. 29 May, 2009.	**2009**
	Low Energy Agro-Ecological Farming (LEAF): Energy use in sustainable agriculture workshop. Department of Agricultural Engineering, University of Georgia. Athens, GA. 23-25 September, 2010.	**2010**
	Jordan, C. F., K. Jacobsen and Y. Carrillo. 2011. Alley cropping in the Southeast. Poster. 12th North American Agroforestry Conference. University of Georgia, Athens, GA. June, 2011.	**2011**
	Schramski, J., K. Jacobsen and T. Smith. The coupling of human and natural systems: Agroecological energy systems modelling and case study of a diversified organic vegetable farm in Kentucky, USA. 18th Biennial International Society of Ecological Modeling Conference, Beijing, China. September 20-23, 2011.	**2011**
INVITED SEMINARS	Sustainable Agriculture Program, University of Kentucky, Lexington, KY	**2009**
	Sustainable Agriculture Program, Sterling College, Craftsbury Common, VT.	**2009**
	Interdepartmental Ecology Graduate Program Seminar Series, Penn State University, University Park, PA.	**2009**
PUBLICATIONS	Jacobsen, K. L. & C.F. Jordan. 2009. Effects of a restorative agroecosystem on soil characteristics and plant production on a degraded soil in the Georgia Piedmont, USA. Renewable Agriculture and Food Systems 24(3): 186-196.	

Starovoytov, A., R.S. Gallagher, K.L. Jacobsen, J.P. Kaye & B. Bradley. 2010. Management of small grain residues to retain legume-derived nitrogen in corn cropping systems. Agronomy Journal 102(3): 895-903.

Jacobsen, K.L., R.S. Gallagher, B. Bradley, M. Burnham, Z.K. Larson & J.Watson. 2010. Mitigation of seed germination impediments in hairy vetch. Agronomy Journal 102(5): 1346-1351.

Jacobsen, K.L., C.L. Escalante, & C.F. Jordan. 2010. Economic analysis of experimental organic agricultural systems on a highly eroded soil of the Georgia Piedmont, USA. 2010. Renewable Agriculture and Food Systems 25(4): 296-308.

Carrillo, Y., C. F. Jordan, K. L. Jacobsen, K.G. Mitchell, & P. Raber. 2011. Shoot pruning of a hedgerow perennial legume alters the availability and temporal dynamics of root-derived nitrogen in a subtropical setting. Plant and Soil 345(1-2): 59-69.

Jacobsen, K.L., K.L. Niewolny, M.S. Schroeder-Moreno, M. Van Horn, A.H. Harmon, Y.H. Chen Faslow, M. Williams, D. Parr. Sustainable Agriculture Undergraduate Degree Programs: A Land-Grant University Mission. Journal of Agriculture, Food Systems and Community Development. *Submitted 12/4/2011.*

Niewolny, K.L., J.M. Grossman, C.J. Byker, J.L. Helms, S.F. Clark, J.A. Cotton, K.L. Jacobsen. Sustainable Agriculture Education and Civic Engagement: The Significance of Community-University Partnerships in the New Agricultural Paradigm. Journal of Agriculture, Food Systems and Community Development. *Submitted 12/4/2011.*

Peer-Reviewed Book Chapters

Tanaka, K., M. Williams, K. Jacobsen and M. Mullen. (*in press*). Sustainably Growing Farmers of the Future: Undergraduate Curriculum in Sustainable Agriculture at the University of Kentucky. In Bartels, K. and K. Parker, *Teaching Sustainability / Teaching Sustainably.* Stylus Publishing, Herndon, VA.

Extension Publications

Reviewer, Organic Crop Production Crop Profile. 2011. Crop Diversification & Biofuel Research & Education Center. http://www.uky.edu/Ag/CDBREC/introsheets/organicproduction.pdf

HONORS AND AWARDS	Outstanding Senior, Virginia Tech College of Arts & Sciences	**2001**
	Outstanding Senior, Virginia Tech Dept. of Biology	**2001**
	Morris K. Udall Scholar	**2000**
COMMUNITY SERVICE	Bluegrass Domestic Violence Program Farming Project- Technical support to develop a working market garden and horticultural therapy gardens at this residential facility for women and children.	**2009 –present**
	Penn State College of Agriculture New Orleans Service Learning Alternative Spring Break, Instructor	**2009**
	Common Ground Athens Board of Trustees Member	**2006-2008**
	Athens Urban Food Coalition, Co-convener	**2009**
AFFILIATIONS	Ecological Society of America, member *Agroecology section, member*	**2005 – present**
	American Society of Agronomy, member	**2009 - present**
	Sustainable Agriculture Education Association, member	**2009 - present**
	North American Colleges and Teachers of Agriculture (NACTA) member	**2011 – present**
PROFESSIONAL DEVELOPMENT	College of Agriculture Teaching and Learning Scholars Program.	**2010 - present**

External Review

Sustainable Agriculture Program

(Individualized /Curriculum)
2012 Periodic Program Review

University of Kentucky
College of Agriculture

Written Report
May, 2012

Prepared by:

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Introduction

The Sustainable Agriculture Undergraduate Program Periodic Review Team was charged by Dean M. Scott Smith of the College of Agriculture with conducting a comprehensive review of the Sustainable Agriculture Program (SAG). The goal of the review was to assess the current status of the program, with the aim of establishing priorities and recommendations that will help strengthen and guide future development. Additionally, Dean Smith asked the committee to evaluate the following aspects of the program: trajectory and growth from an enrollment perspective; resource needs; relationship with other college and university undergraduate programs and sustainability-related initiatives; and whether alternative opportunities such as a certificate program could be developed. The review team was composed of three faculty from the College of Agriculture including Dr. Krista Jacobsen, Dr. Lee Meyer, and Dr. Mark Williams; Dr. Larry D. Jones, an emeriti UK College of Agriculture faculty member; Ms. Jessica Ballard, a program alumnus; and, two external to the university reviewers, Dr. Susan Clark from Virginia Tech and Dr. Julie Grossman from North Carolina State University.

Members of the team visited with students, faculty, and administrators beginning in Lexington on February 20th and concluded on February 21st, 2012. Prior to the on-site visit, the review team was provided with a self-study document that presented an overview and summarized the current status of the program. This document was developed primarily by the Director of Undergraduate Studies for the program, with feedback from the program's self-study committee. The Review Committee found the Self Study document to be helpful and an accurate depiction of the program.

The SAG program began in spring 2007and is administered as an "Individualized Curriculum" at the current time. The curriculum was originally developed by faculty from nine different academic departments including Agricultural Economics, Agronomy (now Plant Sciences), Animal Sciences, English, Entomology, Forestry, Horticulture, Plant Pathology and Sociology. The program has a Director of Undergraduate Studies and a faculty driven steering committee consisting of faculty from Agricultural Economics, Animal Science, Community Leadership Development, Entomology, Horticulture, Nutrition and Food Science, Philosophy, Plant and Soil Science and Plant Pathology. The role of the Steering Committee is to guide course selection and curriculum development to ensure the offerings in their respective departments will best equip students with the skills and knowledge to fulfill the program's learning outcomes. They also provide a critical sounding board for discussing programmatic components that continue to develop, such as the required apprenticeship (SAG 397), integration of SAG core courses into the UK Core course offerings, and opportunities for SAG students to engage in experiential learning and internship opportunities in their home departments. The committee also deals with administrative and pragmatic issues such as reviewing input for SACS accreditation and managing program recruiting and advising.

The remainder of this report is divided into four major sections: Strengths of the Program, Opportunities for Program Development, Recommendations (both short and long term), and a Summary. Written and findings were collected from review team members and summarized for this report.

SAG STRENGTHS:

General:

1. The SAG Program emphasis aligns with the University's strategic plan (goals): e.g.

   1-4. Increase the number of high impact co-curricular activities that support the student's classroom experience in the areas of research, community service, leadership development, internationalization, and inclusion.

2. The program aligns with the College of Agriculture mission on sustainability, including the promotion of sustainable farming and food systems.

Curriculum and Faculty:

1. The SAG Program has a committed faculty who are student-centered and enthusiastic about the program and how the program is committed to serving the College's Land Grant tripartite mission (research, teaching and outreach or extension).

2. Courses are well-sequenced with a logical progression; the curriculum offers diverse pedagogical modalities facilitating student learning outcomes.

3. A significant strength of the program is the Apprenticeship Course (SAG 397) which links 250 hours service learning and the Community Supported Agriculture (CSA) operation. This linkage builds community capacity across disciplines while providing an important service to the UK community at large. In many ways the CSA is a University window to the College of Agriculture.

4. The program is interdisciplinary across "three pillars" or foundations of the program which includes environmental stewardship, economic profitability and social responsibility.

5. The capstone course (SAG 490) provides students with a service learning opportunity. A spring break trip is organized annually for students to have the opportunity to see first-hand a variety of sustainable agriculture systems at a given location in the United States.

6. SAG Students were highly complimentary of the program and the two lead program faculty—Dr. Mark Williams and Dr. Krista Jacobsen. Students noted that they gained a cultural perspective on sustainability, gained a global perspective, identified social issues relevant to sustainability, and developed an understanding of different agricultural productions systems including plants and animals. Importantly, students emphasized that they had also enhanced their skill development as related to agricultural production. Equally significant, students noted they enjoyed the sense of "community" and social networking that occurred as a result of a common interest in SAG not only during their years of undergraduate instruction, but following graduation as well.

7. The review team found the program relevant to prospective employers in that students were prepared to address a variety of social-environmental-economic issues affecting agriculture.

8. The strong support from the Department of Horticulture and the College Administration (Dean and Associate Deans) is particularly noteworthy and is viewed as a tremendous strength for this program's development and bodes well for program quality enhancement.

<u>Partnerships:</u>

1. The UK Organic Farming Unit partnership with campus food procurement (Chef Perry and UK Dining, for example) is illustrative of the relationship between SAG and the UK campus and is highly commendable.

2. Partnerships across academic colleges is a strength of the program. The involvement of the Department of Architecture from the College of Design to help design buildings and facilities at the Horticulture Farm is a current example. Additional examples include integral partnerships with the Department of Sociology in the College of Arts and Sciences to involve students in community food assessments, research with beginning farmers and other research and experiential learning activities.

<u>Working Farm Unit and Outreach:</u>

1. A tremendous asset for students, faculty, and community is the working farm showcasing sustainable agriculture systems, including organic production with relatively close proximity to campus. Such a farm is a rare resource even for a land grant university. Students gain an opportunity for experiential learning; faculty are provided opportunities for collaborative research; farmers and those interested in production systems have an opportunity to visit a working farm to evaluate alternative production systems; UK faculty and staff have an opportunity to participate in the CSA; and, the community

at large (including various student groups) have opportunities to visit the farm.

2. The farm provides UK with a tremendous public relations opportunity about preserving the Commonwealth's farmland legacy.

Programmatic Assessment Plan:

Eight students have graduated from the program, four in 2009, two in 2010 and two in 2011. Two of these students are pursuing graduate degree in sustainable agriculture related fields, and the rest found employment in agriculture-related jobs following graduation. Examples of areas these students are working include Cooperative Extension Service, working at community urban gardens, self employed farming and working at the UK Organic Farming Unit.

SAG OPPORTUNITIES:

1. The program should continue to build on its interdisciplinary strength by exploring and expanding teaching and research collaborations across the college and university.
    a. The Program's Steering Committee should consider internationalizing the curriculum via experiences abroad and the Education Abroad Program at UK.

2. Student capstone course (SAG 490) activities, plus the many outside activities scheduled at the Farm, provide the program with a unique opportunity to seek outside funding streams for faculty and undergraduate students. Broadening the funding base for this course and the SAG program could provide a revenue stream to enhance program quality.

3. Undergraduate Student recruitment should be viewed as a high priority. Examples of recruitment strategies could include:
    a. Webpage video postings highlighting current students and program alumni outlining reasons they chose the program and employment opportunities.
    b. Revisiting an academic student living community centered around SAG.
    c. Revising freshman first-year experiences around SAG.
    d. Devise strategies for SAG promotion during summer freshman orientation (students and parents) as well as fall semester first-day orientation.
    e. The AASHE Sustainability Tracking, Assessment and Rating System Stars data have been delivered, and UK's silver level rating should be used in SAG Program promotion.

4. Explore the issue of remaining cost neutral to the Department of Horticulture and the College of Agriculture. Examine current and prospective revenue streams.

5. A systematic periodic evaluation plan for reviewing program quality should be developed. For example, a periodic review of supporting course content for appropriateness to the SAG program should be performed on a regular basis. Evaluation should be completed on the appropriateness of courses in Nutrition and Food Science and ecological public health.

6. The SAG program could benefit by adding additional interested faculty to be more actively involved in the SAG instructional program. One opportunity would be for a common descriptive language to be involved in new faculty position announcements.

7. Retool program assessment plans to systematically and periodically collect evidence of student learning including:
    a. Documentation of student retention
    b. Track and showcase student accomplishments and graduate profiles
    c. Document job placement

8. Consider expansion of the "organic farm unit" to establish an exemplar "Living Center of Sustainability" that embraces education, research and outreach. Such an initiative could:
    a. Illustrate an integrative farm concept to clientele including students
    b. Consist of a summer Undergraduate Research Institute

9. Explore implementation of an academic standard for entrance and retention which can be compared against other programs

10. Establish a career-jobs skills data base for SAG.

SAG RECOMMENDATIONS:

The SAG program should begin planning on becoming a free-standing major and use a focused recruiting effort to grow its number of majors to the 60 plus needed to justify this status. More specifically:

<u>Short-Term:</u>

1. Compliment the Steering Committee with an Advisory Council comprised of a diverse mix of internal and external stakeholders which might include alumni, community based organizations, representatives of farm groups, etc.

Such a Committee could provide for continuous improvement in program and curriculum.

2. Additional faculty resources are needed for the program to continue to grow, particularly in animal and agronomic (row crop) agriculture. Consideration as noted above should be given to new faculty position announcements that include collaboration with programs such as SAG. Attracting additional faculty in the College and University would help overcome a perception that some may have suggesting that the SAG program is really a Horticultural Science program.

3. The Steering (advisory committee, perhaps) along with the College and appropriate departmental administrators should address the quality/quantity tradeoffs and impacts of increasing student enrollment including resource needs for:
    a. curriculum management – the curriculum includes significant experiential learning components. Expansion may decrease the quality of the instruction and the ability to carry out such activities.
    b. advising
    c. resources (faculty and staff)
    d. line item operating budget

4. Strengthen formal development efforts.

5. Work with the Associate Dean for Academic Programs so that any revision to the GEN 100 college requirement might account for the duplication of material that is also offered in SAG 101. Simply put, perhaps SAG 101 should be a substitute for GEN 100?

<u>Long Term:</u>

1. Develop an Organic Farm Unit incubator.

2. Develop a certificate program in Organic Farming.

3. Develop partnerships and alliances with private farm owners to develop whole farm plans to help create jobs for graduates and to serve as outreach models for other producers to consider.

SUMMARY:

Note that as an external review committee we examined the self study report and found it to be accurate and representative of the program. We found the

conclusions reached in the self study document to be correct. As a committee we sought additional information by visiting with a program graduate, current students, faculty on the steering committee and the College of Agriculture Administration. This study and resulting report documents the program's strengths, opportunities and recommendations for program quality enhancement.

Implementation Plan

UK Program Review Implementation Plan

*This **required** form is described as Appendix A in AR II-I.0.6.*

College/Unit: Sustainable Agriculture Degree Program **Date: 7/15/2012**

Recommendation/ Suggestion	Source I/E/H*	Accept/ Reject**	Unit Response (resulting goal or objective)	Actions (including needed resources)	Time Line
<u>Short Term Recommendations</u> Complement the Steering Committee with an Advisory Council comprised of a diverse mix of internal and external stakeholders which might include alumni, community based organizations, representatives of farm groups, etc. Such a Committee could provide for continuous improvement in program and curriculum.	E	Accept	The steering committee will identify a group of appropriate stakeholders and hold a meeting to discuss the SAG program. This group will be used to provide community feedback, and advise the curriculum steering committee on issues related to curriculum change and evolution.	We will identify appropriate community members and organize a meeting that will be used to develop recommendations for programmatic development.	24 months
Additional faculty resources are needed for the program to continue to grow, particularly in animal and agronomic (row crop) agriculture. Consideration as noted above should be given to new faculty position announcements that include collaboration with programs such as SAG. Attracting additional faculty in the College and University would help overcome a perception that some may have	E	Accept	We will work with the departmental and college administration to identify opportunities for hiring additional faculty that will contribute to the SAG curriculum, and recruit from existing faculty resources.	The DUS and steering committee will initiate discussions with department Chairs and the college Administration to identify existing faculty members that could contribute to the SAG program based on the needs of the program. We will also work with the administration to identify funding opportunities for additional new faculty hiring.	24 months

suggesting that the SAG program is really a Horticultural Science program.					
The Steering (advisory committee, perhaps) along with the College and appropriate departmental administrators should address the quality/quantity tradeoffs and impacts of increasing student enrollment including resource needs for: a. curriculum management – the curriculum includes significant experiential learning components. Expansion may decrease the quality of the instruction and the ability to carry out such activities. b. advising c. resources (faculty and staff) d. line item operating budget	E	Accept	We will evaluate the growth potential of the program and determine resource needs as the program expands. This will include an assessment of how increasing enrollment will affect faculty work load and the effectiveness of aspects of the program that are experiential based, such as the apprenticeship (SAG 397 *Apprenticeship in Sustainable Agriculture*).	The DUS and Steering Committee will assess the current and future resource needs of the program and develop a sustainable growth plan. Additional faculty resources will be determined based on enrollment increase. This will help guide our discussions with departmental chairs and the administration (recommendation 2, above). We will also work with the college administration to identify funding for an appropriate operating budget.	24 months
Strengthen formal development efforts.	I and E	Accept	We will work to formalize the undergraduate program into a B.S. in Sustainable Agriculture.	With the Dean's approval we will initiate the process to formalize the program. We will work closely with the Associate Dean for Instruction to ensure that the process is correctly done and expedited as much as possible.	12-24 months
Work with the Associate Dean for Instruction so that any revision to the GEN 100 college requirement might account for the duplication of material that is also offered in SAG 101.	E	Reject	After discussion with the Dean, we feel that GEN 100 needs to remain as distinct and separate class from SAG101.	No further action.	-

Simply put, perhaps SAG 101 should be a substitute for GEN 100?					
<u>Long Term Recommendations</u> Develop an Organic Farm Unit incubator.	I	Accept	We will assist, in the role of advisors and collaborators, in the development of a farm incubator program in conjunction with local farms.	The DUS and appropriate faculty members associated with the SAG program will work with a local farm to develop an incubator program that could be used by SAG graduates.	4 years
Develop a certificate program in Organic Farming.	E	Accept	We will investigate the feasibility of developing a certificate (or similar)program using existing resources.	The DUS and appropriate faculty members will evaluate resources and define a plan for developing a certificate program.	4 years
Develop partnerships and alliances with private farm owners to develop whole farm plans to help create jobs for graduates and to serve as outreach models for other producers to consider.	E	Accept	We will identify and develop partnerships that can create employment opportunities for our graduates on local farms.	We will work through the advisory steering committee and through the incubator programs (see above) to identify appropriate farmers to help develop opportunities for employment for our graduates.	4 years

* **Source of Recommendation (I = Internal recommendation; E = External Review Committee recommendation; H = Unit Head recommendation)**
** **Accept/Reject Recommendation (A=Accept; R=Reject)**

Unit Head Signature: _____ **Unit Head Supervisor Signature:** _____ **Date:** _____