

September 15, 2010

ROBERT POWELL, Chair
Davis Division of the Academic Senate

Dear Bob,

The College of Agricultural & Environmental Sciences Executive Committee met on July 23, 2010 and reviewed the revised Sustainable Agriculture and Food Systems major approval. It was determined that all requested modification had been made and the Executive Committee approved its resubmission to the Academic Senate for its review and approval.

Please find enclosed an endorsement letter from Neal Van Alfen as well.

The college is strongly supportive of this new major and feels that the proposal has very adequately addressed Academic Senate concerns.

Sincerely,



Jeffrey C. Williams, Chair
CA&ES Executive Committee



Edward J. DePeters, Chair
CA&ES Executive Committee, 2009-10

JCW:sb

cc: Jo Ann Baca
Will Horwath
Ken Shackel
Diane Ullman

September 15, 2010

ROBERT POWELL, Chair
Davis Division of the Academic Senate

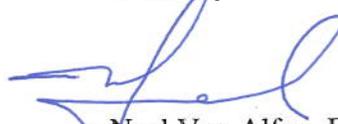
Dear Bob,

This letter is to provide my very strong support for the proposal for an undergraduate major in Sustainable Agriculture and Food Systems. This major is proposed as a collaboration between multiple departments that include Human and Community Development, Land, Air, and Water Resources, Plant Pathology, Animal Science, Environmental Science and Policy, Agriculture and Resource Economics, Plant Sciences, Entomology, and Nematology departments.

In response to previous concerns regarding a departmental home for the major, the revised proposal explicitly states that the Human and Community Development department will serve as the major's first administrative home, and do so for a period of three years. The administrative home responsibilities will then rotate every three years between the following four departments: Human and Community Development, Land, Air, and Water Resources, Plant Pathology, and Animal Science. The master advisor, who is a faculty member of the Academic Senate (Thomas Tomich, Professor of Human and Community Development and of Environmental Science and Policy; ASI Director) will champion the major, but will not play an explicit role in the merit and promotion reviews of participating faculty member. Department chairs and Senate faculty from Human and Community Development, Land, Air, and Water Resources, Plant Pathology, Animal Science, Environmental Science and Policy, Agriculture and Resource Economics, Plant Sciences, Entomology, and Nematology departments will have responsibility to insure the core courses for the major are taught on a consistent basis as required for graduation. Finally, development of this major proposal has been highly consultative for a period of time exceeding six years. The level of consultation is well demonstrated in the co-authorship of the proposal by department chairs and faculty from each of the nine departments that provide administrative or teaching responsibilities in the major. Extensive consultation also occurred with the CA&ES Undergraduate Majors and Courses Committee, the CA&ES Executive Committee, and the CA&ES Dean's Office.

In summary, I am strongly supportive of this new major and from my perspective the revised proposal has more than adequately addressed Academic Senate concerns.

Sincerely,



Neal Van Alfen, Dean
College of Agricultural and Environmental Sciences

NVA: sb

cc: Edward DePeters
Jeffrey Williams

UC Davis
Sustainable Agriculture Curriculum Implementation
Committee Report:
Sustainable Agriculture & Food Systems
Undergraduate Major Proposal

William R. Horwath, Committee Chair
Department of Land, Air and Water Resources

Committee Members

Steve Brush, Human and Community Development

Howard Cornell, Chair – Environmental Science and Policy

Anita Oberbauer, Chair – Animal Science

Tom Gordon, Chair – Plant Pathology

Luis Guarnizo, Chair – Human and Community Development

Randy Dahlgren, Chair – Land, Air and Water Resources

Mark Van Horn, Director – Student Farm

Richard Howitt, Chair – Agricultural and Resource Economics

Chris van Kessel, Chair – Plant Sciences

Michael Parrella, Chair - Entomology

Maggie Lickter, Undergraduate Student

Steve Nadler, Chair - Nematology

Damian Parr, Graduate Student

Johan Six, Plant Sciences

Thomas Tomich, Director – Agricultural Sustainability Institute

**Diane Ullman, (Ex Officio) - Associate Dean for Undergraduate Academic
Programs, CA&ES**

Sustainable Agriculture & Food Systems

Undergraduate Major Proposal

Introduction

In 2004, the CAES Executive Committee charged the Sustainability Curriculum Workgroup (SCW) with the responsibilities to: *“assess the recommendations of the curriculum subcommittee of the Bradford committee, identify workable administrative structures, and propose course content where appropriate, in order to implement a new undergraduate curriculum in sustainable agriculture.”*

This proposal represents the efforts of faculty and students to design an innovative curriculum in sustainable agriculture that integrates learning across broad disciplines to give students the knowledge, skills and expertise to enhance their career opportunities and become leaders in sustainable agriculture. The curriculum draws from both traditional and nontraditional teaching concepts and methods used in higher education, placing a strong emphasis on experiential learning. The innovative content and methodologies of the major require similarly innovative administrative approaches and the committee has also developed a plan for an administrative structure and processes that are designed to support the major and its evolution over time.

Some principles that guided the development of the Sustainable Agriculture and Food Systems (SAFS) major include:

1. Provide a broad background in natural and social sciences that would support several career tracks and be attractive to a broad range of potential students.
2. Focus on the interaction between agriculture, society and the environment.
3. Integrate experiential learning opportunities throughout the curriculum.

Background and Rationale

The concept of sustainable agriculture has emerged to address past and present issues associated with agriculture both in the US and internationally. These issues include deterioration of agricultural and natural ecosystems, declining profitability, social disenfranchisement, and inequities in food distribution. The ideals of sustainable agriculture integrate three main goals related to modern agriculture: environmental health, economic profitability, and social and economic equity - all within the context of meeting the current needs of humanity without compromising the ability of future generations to meet their own needs. In the past few decades, a number of studies called into question the Land Grant Universities' (LGU's) fulfillment of their promise to meet the needs of their mandated constituencies. In *“Reinventing Undergraduate Education: A Blueprint for America's Research Universities,”* the Boyer Commission (1998) called for significant reformation of LGU's methods of knowledge transfer. Land Grant Colleges of Agriculture (LGCA) have also been criticized (Kunkel, 1992; National Research Council, 1996) for neglecting teaching and learning. The National Research Council's *“Colleges of Agriculture at the Land Grant Universities: Public Service and Public Policy”* report (1996) identified a number of problematic conditions weakening the performance of LGCA.

The UC Davis faculty, students, and administration have been active in addressing these calls for reform of undergraduate agriculture education. Outcomes from several committees (CAES Sustainable Agriculture Committee [Bradford I], CAES Agricultural Sustainability Implementation Committee [Bradford II], and Sustainable Curriculum Workgroup Committee) and public meetings served to clarify the need for a purposefully designed sustainable agriculture undergraduate major. The Sustainable Agriculture Curriculum Implementation Committee [Department Chairs] was appointed to develop the courses, curriculum, and administrative structure necessary to implement the recommendations for a new major based on the outcome of these committees and meetings. This proposal represents the culmination of the work of the Implementation [Chairs] Committee.

Guiding Principles of the Sustainable Agriculture and Food Systems Major

The principles are based upon an overarching vision of sustainability and were developed following extensive stakeholder research conducted by members of the Sustainable Curriculum Workgroup (see list of publications in Appendix A). In addition to the curriculum's content, its advising process, and administrative structure are designed to create an educational experience that is consistent with these principles.

1. **Interdisciplinary:** Integrating natural and social science knowledge, skills and understanding through interdisciplinary coursework.
2. **Systems Thinking:** Gain an appreciation of interconnections among the components of agri-food systems, social institutions, and the ecological constructs of the environment.
3. **Skill Development:** Students require a broad range of practical skills to effectively act on the knowledge and theory of sustainable agriculture.
4. **Experiential Learning:** Encourage synergy between theory and practice by integrating experiential learning activities into core courses, and requiring that students “get their boots dirty” through on- and off-campus internships and agricultural production courses.
5. **Community Building:** Developing and maintaining healthy communities are goals of sustainable agriculture. This applies to the scholar community within the major, as well as fostering community development locally, regionally, and globally.
6. **Adaptive Curriculum Management:** To facilitate evolution of the curriculum, the major provides mechanisms for input from stakeholders, including students, alumni, faculty, administration, practitioners, and the Agricultural Sustainability Institute.

Curriculum Description

The major is designed to provide students with broad preparatory course work and substantial flexibility in their upper division course selections in order to develop the diversity and depth of knowledge required for working in sustainable agriculture and food systems. The SAFS major will draw substantially from both natural and social sciences. The common preparatory classes provide all students within the major with a common training platform across a multitude of disciplines. Each student will choose an individualized course of study from within three tracks: Agriculture and Ecology, Food and Society, or Economics and Policy. The General Catalog formatted undergraduate program description, with all required course listings can be found in Appendix B.

At the heart of the curriculum model is an interdisciplinary set of common and experiential core courses, which will further enable all students in the major to develop a shared knowledge base and social network. The core courses begin with lower division classes in sustainable agriculture (PLS 15) and food systems (CRD 20), progress through upper division courses focused on sustainability and agroecosystem management (PLS 150) and economics of agricultural sustainability (ARE 121) and culminates with the senior level capstone sequence (ESP 191 A & B). All six of the core courses, which are described in Appendix C, are new courses and have been approved by the Academic Senate. All but the capstone courses were taught in 2008-2009 and 2009-2010. The teaching of the majority of the core courses provides an opportunity for continuing students to transition to the new SAFS major.

Once the students have completed their common preparatory and lower division core courses, they will continue their studies in one of the three tracks. The preparatory courses in each track provide basic disciplinary training, while the depth courses provide a selection of courses that can fulfill specific topical elements, plus a large menu of restricted electives. In consultation with advising personnel (see Advising Structure, below) each student will prepare an individualized course of study that identifies the internship and courses they will take to complete the major. In the capstone courses, students will bring their unique, but complementary coursework and fieldwork experiences to bear on specific case studies. The capstone sequence is designed to create an interactive environment where students from different tracks gain an appreciation of the multifaceted elements of sustainable agriculture.

Internships

All students will be required to complete a total of 12 units of internship, at least 8 units of which must be with one or more off-campus entities focused on elements of sustainable agriculture or food systems. Internships are intended to provide career development through real-world practical experience in professional settings.

Advising Structure

The SAFS major is highly individualized and experiential, and hence the advising structure has been designed to meet the individual students' needs. The proposed structure includes the following:

- a. Master Advisor
- b. Advising Associate/Internship Coordinator (new position within ASI)
- c. Peer Advisor (an upper division SAFS student)
- d. An Advising Committee for the major, comprised of the Master Advisor, three of the professors who teach in the six core courses, Peer Advisor, and the Advising Associate/Internship Coordinator
- e. One Advising Professor per student nominated by the student and approved by the advising committee.

The Advising Associate/Internship Coordinator will have an appointment in ASI with an office in Robbins Hall. This position will be responsible for academic advising and coordinating student internships.

Administrative Structure

The interdisciplinary nature of the new major requires the expertise and participation of a diverse range of departments. As such, the Human and Community Development; Land, Air, and Water Resources; Plant Pathology; Animal Science; Environmental Science and Policy; Agriculture and Resource Economics; Plant Sciences; Entomology; and Nematology departments will provide the academic leadership for the major and contribute to the Committee in Charge. The Human and Community Development department will serve as the major's first administrative home, and do so for a period of three years. The administrative home responsibilities will rotate every 3 years between the following four departments: Human and Community Development, Land, Air, and Water Resources, Plant Pathology, and Animal Science.

The major's Committee in Charge consists entirely of Senate faculty members, including:

- a. Master Advisor, who is a faculty member of the Academic Senate to champion the major.
(Thomas Tomich, Professor of Human and Community Development and of Environmental Science and Policy; ASI Director)
- b. Department Chairs and Senate faculty from Human and Community Development; Land, Air, and Water Resources; Plant Pathology; Animal Science; Environmental Science and Policy; Agriculture and Resource Economics; Plant Sciences; Entomology; and Nematology departments, whose responsibility it is to insure the core courses for the major are taught on a consistent basis as required for graduation.

Consultation with Affected Parties

This major proposal has been developed through six years of consultation with affected parties. This consultation is reflected in the co-authorship of the proposal by department chairs and faculty from each of the units that provide administrative or teaching responsibilities in the major. In addition to the co-authorship of nine departments, consultation and support has been gathered from CAES Undergraduate Majors and Courses Committee, the Executive Committee, and the CAES Dean's Office.

Implementation

The Academic Senate has approved all six of the required core courses. All but the capstone courses were offered in 2008-2009 and 2009-2010. All courses needed to offer the curriculum are now in place.

The Major Program

The major serves those interested in improving the sustainability of agriculture and food systems. This major prepares graduates to understand the interdisciplinary and systems-based aspects of sustainability and provides them with the knowledge, leadership skills and experiences required to excel in agricultural and food systems professions.

The Program

This program is designed to develop students' competencies for addressing the environmental, social, and economic challenges and opportunities associated with agricultural and food systems sustainability. The program emphasizes an experiential learning approach to sustainability education, allowing students to choose between three tracks within the major. Students in the

Agriculture and Ecology track will focus on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits. Students in the Food and Society track will focus on issues related to the social, cultural, political and community development aspects of agriculture and food systems. Students in the Economics and Policy track will focus on issues related to agricultural and resource economics, policy and management. The program provides students with practical experiences through courses with on- and off-campus fieldwork and through internship placements at sites related to students' interests and focus of study.

Internships and Career Alternatives

Sustainable Agriculture and Food Systems students are required to complete an internship in the field before graduation. Internships have been arranged with local, county, and state agricultural agencies, production farms and commercial processors and retailers, domestic and international non-profit organizations, and rural and urban community development programs. Graduates are prepared to pursue a broad range of careers related to agricultural production and food system management, rural and urban community services, education and development, and agricultural and environmental sciences, as well as careers in agricultural, environmental, and economic policy and analysis. Positions may be in private industry, government and public service agencies and in the non-profit sector, nationally and internationally. The major also prepares students for graduate studies in a wide range of fields related to agriculture and food systems.

Appendices

Appendix A.

Relevant research publications by Sustainable Curriculum Workgroup

Parr, D., Trexler, C.J., Khanna, N.R., Battisti, B.T. 2007. [Designing Sustainable Agriculture Education: Academics' Suggestions for an Undergraduate Curriculum at a Land-Grant University.](#) *Agriculture and Human Values*, 24(4): 523-533

Parr, D. and Van Horn, M. 2006. [Development of Organic and Sustainable Agricultural Education at the University of California, Davis: A Closer Look at Practice and Theory.](#) *HortTechnology*, 16(3): 426-431.

Trexler, C.J., Parr, D., Khanna, N.R. 2006. [A Delphi Study of Agricultural Practitioners' Opinions: Necessary Experiences for Inclusion in an Undergraduate Sustainable Agricultural Major.](#) *Journal of Agricultural Education*, 47(4): 15-24.

Appendix B.
General Catalog formatted undergraduate program description

Sustainable Agriculture and Food Systems

(College of Agriculture and Environmental Sciences)
Sustainable Agriculture and Food Systems is an interdisciplinary major in Human and
Community Development
Thomas Tomich, Ph.D., Program Director

Program Office. 143 Robbins Hall (530) 752-1636
<http://asi.ucdavis.edu>

Committee in Charge

Richard Howitt, Ph.D. (Agricultural & Resource Economics)
Anita Oberbauer, Ph.D. (Animal Science)
Michael Parrella, Ph.D. (Entomology)
Howard Cornell, Ph.D. (Environmental Science & Policy)
Luis Guarnizo, Ph.D. (Human & Community Development)
Ryan Galt, Ph.D. (Human & Community Development)
Randy Dahlgren, Ph.D. (Land, Air & Water Resources)
William Horwath, Ph.D. (Land, Air & Water Resources)
Steve Nadler, Ph.D. (Nematology)
Tom Gordon, Ph.D. (Plant Pathology)
Chris van Kessel, Ph.D. (Plant Sciences)
Thomas Tomich, Ph.D. (Human & Community Development, Environmental Science &
Policy)

The Major Program

The Sustainable Agriculture and Food Systems (SAFS) major serves those interested in improving the sustainability of agriculture and food systems. This major prepares graduates to understand the interdisciplinary and systems-based aspects of sustainability and provides them with the knowledge, leadership skills and experiences required to excel in agricultural and food systems professions.

The Program

This program is designed to develop students' competencies for addressing the environmental, social, and economic challenges and opportunities associated with agricultural and food systems sustainability. The program emphasizes an experiential learning approach to sustainability education, allowing students to choose between three tracks within the major. Students in the Agriculture and Ecology track will focus on crop and animal production systems, ecology, and practices that mitigate negative impacts while

producing environmental and social benefits. Students in the Food and Society track will focus on issues related to the social, cultural, political and community development aspects of agriculture and food systems. Students in the Economics and Policy track will focus on issues related to agricultural and resource economics, policy and management. The program provides students with practical experiences through courses with on- and off-campus fieldwork and through internship placements at sites related to students' interests and focus of study.

Internships and Career Alternatives

Sustainable Agriculture and Food Systems students are required to complete an internship in the field before graduation. Internships have been arranged with local, county, and state agricultural agencies, production farms and commercial processors and retailers, domestic and international non-governmental organizations, and rural and urban community development programs. Graduates are prepared to pursue a broad range of careers related to agricultural production and food system management, rural and urban community services, education and development, and agricultural and environmental sciences, as well as careers in agricultural, environmental, and economic policy and analysis. Positions may be in private industry, government and public service agencies and in the non-profit sector, nationally and internationally. The major also prepares students for graduate studies in a wide range of fields related to agriculture and food systems.

B.S. Major Requirements:

	UNITS
English Composition Requirement.....	4-8
See College requirement, must include Communications 1.	
Core Courses.....	24-26
Plant Sciences 15	4
Community and Regional Development 20	4
Plant Sciences 150	4
Agricultural and Resource Economics 121	4
Plant Sciences 190	2-4
Environmental Science and Policy 191A, 191B	6
Internship Requirement	12
Students must complete at least 12 units of internship, 8 of which must be completed off-campus.	
Applied Production	6-9
Plant Sciences 49 or Plant Pathology 40 or Viticulture and Enology 101A or 101B or 101C or Environmental Horticulture 120 or	
Plant Science 131	2-3

Animal Science 49A-J, Animal Science 41L	2-3
Applied Biological Systems Technology 49 or 52 or 101 or 142	2-3

Note: Summer field study courses such as Soil Science 105 (5 units) and Entomology 109 (7 units) are also appropriate, but not listed because their large unit load would impact the total courses offered in this section. Advisors will make students aware of these courses.

Track I: Agriculture and Ecology

Focuses on crop and animal production systems, ecology, and practices that mitigate negative impacts while producing environmental and social benefits.

	UNITS
Preparatory Subject Matter	59-60
Mathematics 16A, 16B	6
Plant Sciences 120 or Statistics 100	4
Chemistry 2A, 2B	10
Physics 1A	3
Biological Sciences 2A, 2B	9
Plant Sciences 2	4
Animal Sciences 1 or 2	4
Food Science 1	3
Economics 1A	4
Community and Regional Development 1	4
Philosophy 14 or 15 or 24	4
Anthropology 2 or Political Science 4 or Sociology 1 or Sociology 3	4-5
Depth Subject Matter	34-38
Agricultural and Resource Economics 120 or 147 and Environmental Science and Policy 161 or 169	6-8
Soil Science 100 or Soil Science 109	4-5
Animal Science 129 or Environmental Horticulture 160 or Environmental Science and Policy 100 or Evolution and Ecology 101 or Plant Pathology 117 or Plant Sciences 105 or 142 or Wildlife, Fish, and Conservation Biology 154	4-5
Additional restricted electives chosen in consultation with an advisor	20
Unrestricted Electives	27-41

Track II: Food and Society

Focuses on issues related to the social, cultural, political and community development aspects of agriculture and food systems.

	UNITS
Preparatory Subject Matter	57-63
Philosophy 5 or 31	4
Philosophy 14 or 15 or 24	4
Sociology 46B or Statistics 13	4
Community and Regional Development 151 or Applied Biological Systems Technology 180 or Landscape Architecture 150 or Statistics 103 or Sociology 106	3-6
Chemistry 2A	5
Biological Sciences 2A or 10	4
Plant Sciences 2	4
Evolution and Ecology 2 or 11 or Biological Sciences 2B or Environmental Science and Policy 1 or 30 or Wildlife, Fish, and Conservation Biology 10 or 11	3-5
Food Science 1	3
Soil Science 10	3
Economics 1A	4
Political Science 4	4
Anthropology 2 or Sociology 1 or Sociology 3	4-5
Community and Regional Development 1, 2	8
Depth Subject Matter	43-44
Agricultural and Resource Economics 112 or 150	4
Agricultural and Resource Economics 147 or 176 or Environmental Science and Policy 160 or 161 or 169 or 172 or 179	3-4
Anthropology 101 or 102 or Community and Regional Development 142 or 152 or International Agricultural Development 103 or Sociology 139 or 144 or 145A or 145B	12
American Studies 101C or 155 or History 172 or Nature and Culture 120 or Philosophy 109	4
Additional restricted electives chosen in consultation with an advisor	20
Unrestricted Electives	17-35

Track III: Economics and Policy

Focuses on issues related to agricultural and resource economics, policy and management.

	UNITS
Preparatory Subject Matter	60-63
Mathematics 16A, 16B	6
Sociology 46B or Statistics 13	4
Agricultural and Resource Economics 106 or Statistics 103 or Sociology 106.....	4
Chemistry 2A	5
Biological Sciences 2A or 10	4
Plant Sciences 2	4
Evolution and Ecology 2 or 11 or Biological Sciences 2B or Environmental Science and Policy 1 or 30 or Wildlife, Fish, and Conservation Biology 10 or 11	3-5
Food Science 1	3
Soil Science 10	3
Economics 1A, 1B	8
Political Science 4	4
Anthropology 2 or Sociology 1 or Sociology 3	4-5
Community and Regional Development 1	4
Philosophy 14 or 15 or 24	4
Depth Subject Matter	43-44
Agricultural and Resource Economics 112 or 150 or 157.....	4
Agricultural and Resource Economics 120 or 130 or 147 or 176 or Environmental Science and Policy 160 or 161 or 169 or 172 or 179	11-12
Anthropology 101 or 102 or Community and Regional Development 142 or 152 or International Agricultural Development 103 or Sociology 139 or 144 or 145A or 145B	8
Additional restricted electives chosen in consultation with an advisor	20
Unrestricted Electives	17-32
Total Units for the Major	180

Major Adviser. Thomas P. Tomich (Human & Community Development, Environmental Science & Policy)

Advising Center for the major is located in 143 Robbins Hall, Agricultural Sustainability Institute (530) 752-1636

Appendix C.
Expanded outlines of SAFS core courses

Introduction to Sustainable Agriculture (PLS 15) 4 Units

General introduction to agricultural sustainability emphasizing natural science perspectives within an integrated multidisciplinary context that also includes social, economic and political perspectives. We will ask what is agriculture, what is it for, and how has it evolved and developed? We will explore concepts, perspectives, definitions and measures of sustainability and the evolution of the concept of sustainable agriculture. We will examine agricultural resources, functions, productivity, food chains and outputs, including externalities. We will study several historic and current agricultural systems and practices and their relative sustainability, as well as alternatives designed to improve agricultural sustainability and their relative success. Laboratories will engage students in hands-on, in-field activities that highlight the relationship between sustainable agriculture principles and practices and allow them to observe a wide range of crop and livestock production practices, agricultural systems and food systems that are found on and near the campus.

Food Systems (CRD 20) 4 Units

Through a social science approach, this course helps students understand contemporary agri-food systems and assess the possibilities for agricultural sustainability and equity. The course emphasizes the processes of extraction, production, processing, distribution, and consumption in food systems at various scales, from the local to the global. We also study the societal context of food systems by positioning them within a capitalist political economy and multi-scalar governance regimes. We ask about the broader social purpose of food systems, including the current and often contradictory goals of nourishment, productivity, profit, and power. We examine specific commodity chains in historical and geographical context and understand their environmental and social outcomes, including impacts on the biophysical environment, producers' livelihoods, citizens, and communities. Students will be introduced to diverse social science approaches, especially political economy and various aspects of poststructuralism. Students use experiential learning methods to develop both knowledge and skills used in critically analyzing food systems. Case studies explore the historical and current positions of different stakeholders in the food system and include service-learning or action-based research. The course complements PLS015 by providing a social science perspective on food and agriculture within the context of integrated multidisciplinary.

Sustainability and Agroecosystem Management (PLS 150) 4 Units

This course is based on a framework of interdisciplinary analyses of agricultural production and food systems with primary emphasis on biophysical factors, processes and interactions. Focus will be on general concepts governing the functioning of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability across

the globe. We will examine strategies to increase resource use efficiency while minimizing negative impacts on the environment and ensuring socio-economic viability in temperate and tropical regions. We will conduct comparative analysis of approaches to agriculture and its sustainability, including historical examples and trends, alternative systems, and its relationship to other land uses. We will explore how to holistically plan and manage systems for all-encompassing ecological sustainability. Laboratory activities will provide hands-on experience in ecological analyses of agricultural systems, e.g. nutrient budgeting, evaluating insect population dynamics, assessing crop competition, appraisals from the field to the watershed scale.

Economics of Agricultural Sustainability (ARE 121) 4 Units

The course will help students understand economic concepts and apply them to real-world agro-environmental issues relevant to agricultural sustainability. The first part of the course introduces fundamental economic concepts such as consumer and social economic surpluses and discusses the efficiency of markets, with two types of market failures, monopoly and production externalities. Production externalities are linked directly to sustainability issues. Using a multi-period model, the concepts of dynamic efficiency and sustainability are then contrasted. In the second part of the course, different types of government intervention and their rationale are presented, with a focus on agro-environmental policies. Determinants of the evolution of farm structure are discussed. Tools to assess the impact of trade liberalization on sustainability are presented. The last part of the class is devoted to the issue of product differentiation, and includes case studies that illustrate how consumers can play a leading role in promoting agricultural sustainability. The course is comprised of three hours of lecture per week for presentation of concepts and methods, and one hour of discussion where applied exercises are solved in an interactive way. Students are expected to attend lectures and discussion sections, complete problem sets, take a midterm and a final, and write a term paper.

Workshop on Food System Sustainability (ESP 191A) 3 Units

Designed to be a culminating experience for seniors in the undergraduate major in sustainable agriculture and food systems, this course will be the first of an integrated, two-quarter series. Students are expected to take 191A and 191B in sequence. This course format will allow for comprehensive, integrative projects that require more time to develop, implement, and critique. Course staff will network with individuals, groups, and organizations (including farmers and ranchers, agribusiness and other private-sector firms, community and environmental non-profits, the media, and public officials and policymakers) at the forefront of sustainable agriculture and food systems to assist students in identifying and developing their projects. Alternatively, students may take the initiative in identifying and developing their own projects with consent of the instructor(s).

Students are expected to work in multidisciplinary teams to analyze specific problems and opportunities from the perspectives of various stakeholders, including key decision-makers, to synthesize information on alternatives and to draw implications for action, and thereby to put

into practice knowledge and skills gained throughout their previous courses in the major. Projects will take an integrated, multi-disciplinary approach, involving agricultural, environmental, and social sciences, and, hence, require teamwork. Projects may be formulated at many scales, including the farm, ranch, or enterprise level, or at the community, watershed, regional, state, national, or global scale. Illustrative examples include (but are not limited to) design and implementation of campaigns to improve access to food and consumer information; community organizing around school gardens; assessment of the impact of community-supported agriculture or farmers' market projects; communication projects aimed at raising awareness of sustainability challenges and response options; analyses of policies, programs, and/or practices for addressing climate change; resource conservation; land, air and/or water resource management; farm labor issues; viability of small- and mid-sized farms; energy efficiency; agrochemical pollution; and integrated pest management. By week three, students will complete initial consultations with stakeholders, identify their project in response to their assessment of users' needs, form teams, and begin setting and prioritizing the project goals. In weeks four through nine students will analyze problems and opportunities and identify strategies to fulfill the goals of their project; expand their understanding through research; and actively participate in the hands-on experience of their particular project. Students will present and jointly critique challenges, successes, and processes with each other and with the instructor(s) while analyzing skills and knowledge they are utilizing. The first quarter in this two-quarter sequence will conclude with team presentations in which students will reassess their original goals and methodologies, discuss interim conclusions, critique their performance, and share what they have learned.

Workshop on Food System Sustainability (ESP 191B) 3 Units

A continuation of ESP 191 A, workshop time in weeks one through four will be used to further develop projects through presentation and discussion to highlight issues students face in their multidisciplinary collaboration and as they grapple with real-world complexity. When obstacles arise, workshop participants will collaborate to identify strategies to overcome them. The instructor(s) will facilitate students' efforts to identifying and access additional resources for their projects and in reflection on and critique of work in progress. Beginning in week five, each team in turn will present their findings and conclusions in a written draft report and a public presentation. Potential users of the work will be invited, as well as other students, professors, and community members. Students will polish public speaking skills and presentation techniques. The overall goal is for teams to develop an integrated analysis of problems and opportunities and to develop a set of options for action, assessing advantages and disadvantages of alternatives.