

**STOCKBRIDGE SCHOOL OF AGRICULTURE  
DEPARTMENT/PROGRAM PLANNING PROCESS 2014-15**

**Overview**

The Stockbridge School of Agriculture is both a very old and a very new unit in the University. Rooted in the original Land Grant College, the Massachusetts Agricultural College founded 150 years ago, a two-year program for “practical agriculture” was named the Stockbridge School nearly 100 years ago.

The Stockbridge School primarily focuses on sustainable agriculture, plant biology, soil chemistry and ecology, horticulture and equine management. The department has 21 tenure-system and 4 non-tenure-system faculty.

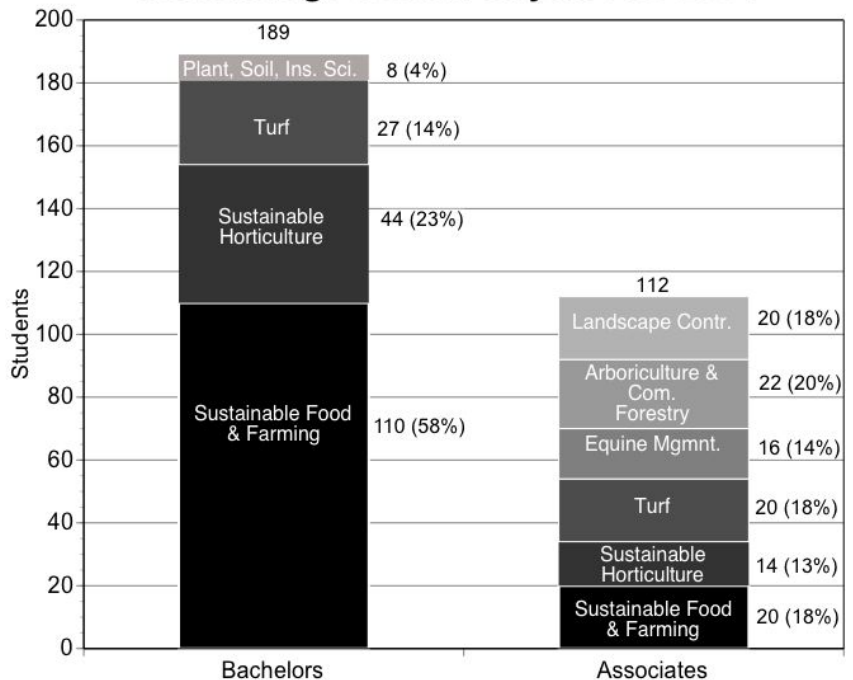
Three years ago, the Stockbridge School expanded to include a program with four **Bachelor’s Degree** majors:

- Sustainable Food & Farming
- Sustainable Horticulture
- Turfgrass Science & Management
- Plant, Soil and Insect Sciences

The School continues to offer **Associate Degrees** in six majors:

- Equine Management
- Arboriculture & Community Forest Management
- Landscape Contracting

**Stockbridge School Majors Fall 2014**



- Sustainable Food and Farming
- Sustainable Horticulture
- Turfgrass Management

**Ph. D. and Master's Degrees** are offered through the Plant Biology, Molecular & Cellular Biology, and Environmental Sciences Graduate Programs.

**The Stockbridge School of Agriculture Vision.** The Stockbridge School of Agriculture will build upon a historical tradition and public commitment to support sustainability at the local, national, and global levels through research and education in economic vitality, environmental integrity, and social justice of sustainable landscape and agricultural systems.

### **Self-Assessment**

#### **Strengths, Weaknesses, Opportunities and Threats**

*As part of the process of self-assessment, the department developed a list of strengths, weaknesses, opportunities and threats.*

#### ***Helpful, internal strengths***

- Environmental and soil chemistry, phytoremediation research. Issues related to soil pollution and sustaining soils.
- Environmental stress impacts on plants – climate change issues related to plants.
- Sustainable agriculture undergraduate program large and growing.
- Critical mass in plant pathology research and education.
- Excellence in undergrad career preparation and satisfaction of graduates with Stockbridge programs.
- Horticultural production education – largest program in New England, unique in MA.
- Agricultural Learning Center; turf, fruit and vegetable research farms unique in New England; they can and do generate funds.
- Agricultural and horticultural outreach program a leader in New England and unique in MA.
- Strength in recruiting and training international graduate students.
- 150 years of legacy – reputation, recognition; development strong.
- Associate degree program is unique within the University; also has 100% job placement for graduates.

#### ***Harmful, internal weaknesses***

- Aging faculty with too few assistant and associate professors relative to School size.
- Nearly 1/3 of faculty bringing in \$5,000/yr or less in research dollars over last 3 years.
- Limited number of students in some majors; Turf major declining enrollment.
- Lack of innovation in revitalizing majors to attract student interest.

- Too many courses with low enrollment.
- Not offering key courses due to lack of faculty (e.g. entomology courses, plant breeding; plant biotechnology courses).
- Loss of large, Gen. Ed. class numbers, e.g. Botany for Gardeners, Plagues, Insects & Society.
- Extension specialists and Extension faculty in different administrative units complicating collaboration.
- Areas of research strength need more focus, higher proportion of faculty need to be identified with other colleagues in a focus area.
- Expertise often identify with commodities rather than disciplines (e.g. apples instead of woody plant physiology).
- Little input and control of graduate program(s); options are all external to the School.
- Coordination in grad and undergrad education with closely related departments poor.

***Helpful, external opportunities***

- Increasing public and student interest in local food, the environment, sustainability in general.
- Other institutions and state government agencies need applied agricultural expertise.
- \$6 billion in agricultural sales in MA, with over 70% of that in horticultural businesses.
- Urban/suburban/rural interface – strong direct sales markets; strong interest in urban agriculture.
- Opportunities for phytoremediation, environmental/plant issues with soil in MA.
- New farmers frequently without agricultural background, need and want education and outreach.
- Global climate change will create stress issues in crops: extremes in water and temperature.
- Environmental pollution issues with soils and plants are increasingly important; urban soils have high heavy metal and other contaminants.
- The Center for Agriculture, Food & Environment maintains strong research farms.
- Collaborations with Env. Conservation in development of new undergraduate sustainability opportunities and interdepartmental graduate program
- Research collaborations with other on-campus departments who need experienced, applied components in projects related to soils and plant production.
- Strong connections to farming and horticultural businesses in MA and New England.

### ***Harmful, external threats***

- Other departments/grad programs protective of faculty teaching time, undergrad enrollments, program requirements.
- Graduate program is tied to interdepartmental programs controlled by powerful departments.
- Enrollments in classic horticultural and agricultural disciplines declining nationally.
- Funding from USDA often generates lower overhead than other sources.
- Metrics for evaluation of Extension outreach differ from those normally used for research, teaching and service on campus - difficult to communicate Extension's value to our academic community.
- Department generally perceived by University colleagues as weak and lacking scholarly rigor.
- UMass Extension no longer has significant county level/local staffing; recognition of Extension low (e.g. Public asks "Does UMass still have Extension?")
- Golf and related turf industries in decline nationally.
- Other universities in MA have co-opted some USDA funding, e.g. Tufts.
- The Massachusetts population has low recognition of UMass Amherst as the primary educational and research institution regarding the farming and green industries in New England.

### ***Environmental Scan***

*The third phase of the planning process for the University asks each department to examine where they stand in terms of being an "investment of choice" for internal and external funding, and a "destination of choice" for undergraduate and graduate students.*

***1. At present, how would you describe your department's place in your discipline? What is its special character or niche? What are you known for by colleagues elsewhere? Understanding that departments cannot do everything, what subfields or foci have attained critical mass?***

**Response:** The Stockbridge School of Agriculture is a major part of agriculture programming at The University of Massachusetts Amherst, and a recent U.S. News evaluation of Best Global Universities for Agricultural Science ranked UMass Amherst eighth globally ( <http://bit.ly/1vC5vXw> ). Thompson Reuters lists a faculty member working in environmental and soil chemistry, as one of eight University of Massachusetts Amherst faculty members in "*Highly Cited Researchers 2014*". Research in this area, as well as in phytoremediation, environmental stress on plants and production of ethnic crops, brings graduate students and post-docs to Stockbridge from around the world.

Our strengths lie in the following areas:

- ✓ Environmental and soil chemistry
- ✓ Phytoremediation of soils
- ✓ Environmental stress on plants
- ✓ Sustainable agriculture
- ✓ Sustainable recreational landscape management
- ✓ Horticultural and agronomic outreach
- ✓ Plant pathology

The Stockbridge Associate Degree program is unique within the University of Massachusetts System. Graduates have a 100% job placement rate. Graduates of the Bachelor's program rate their career preparation, guidance, advising and overall satisfaction with the program among the very highest in the University.

Research, teaching and Extension outreach in Stockbridge provides unique resources in production agriculture to the Commonwealth and New England. A recent article in the Boston Globe described a future for New England agriculture that would increase food production in New England to 50% of the total needed and increase farmland three-fold by 2060 (<http://bit.ly/1HExBW2> ). This story exemplifies the rapidly growing interest in local agriculture and food security in the Northeast. Stockbridge is singularly well equipped to support such development.

This public interest in sustainability, and related issues such as climate change, has been incorporated into the Strategic Planning of USDA, and the National Institute of Food and Agriculture (<http://1.usa.gov/1HEyCxp> ; <http://1.usa.gov/1zqfKMF> ). In these plans we see “sustainable and diverse food production systems”, “adaptation of crop and livestock agriculture to climate variability”, development of sustainable regional feedstock systems for bioenergy production and bio-based products” and “improved food safety and nutrition” all listed as high priority challenges.

Stockbridge has taken a lead in working on sustainable and diverse production systems. We have developed an innovative outreach and research program in integrated pest management (IPM) targeting the diversified, small-scale horticulture typical of the Northeast, involving organic growers, that builds on our strong history in IPM. In another notable program, we have brought new kinds of vegetables from South America, Central America and Asia to be grown in Massachusetts for sale to growing immigrant markets in the state. We are in the process of developing a project in urban agriculture that uses our strength in soil pollution remediation to mitigate heavy metal and other problems frequently found in urban soils. Our expertise in environmental stresses on plants meshes with NIFA's priority to address climate change impacts on agriculture. Members of our faculty work on biofuel research and on food safety issues. Stockbridge aligns very well Federal priorities.

The Massachusetts Department of Agricultural Resources echoes many of the priorities of USDA, with particular emphasis on urban agriculture and Good Agricultural Practices. GAP is a program to reduce microbial risks to food through research and Extension education. A Stockbridge researcher is working with an organic system at the S. Deerfield farm, looking at integration of pigs with vegetable production to minimize

contamination of vegetables while still using pig waste as a soil amendment, a project funded by MDAR. Stockbridge has an excellent working relationship with MDAR.

***2. What is your department's role in your college and in the University? How do you contribute to the college and campus scholarly mission? In what ways does your department engage in interdisciplinary activity?***

**Response:** Within CNS and the University, Stockbridge provides education, research and outreach in applied problems related to plant production for food and landscapes and in issues related to soils, the critical substrate on which plants depend. Stockbridge also has an Associates degree program in equine science.

In addition to research in the areas listed as strengths above, Stockbridge faculty collaborate in the Plant Biology program, primarily in conjunction with the Departments of Biology and Biochemistry & Molecular Biology. Stockbridge connects fundamental research in the School and in these other departments with real-world agricultural and environmental issues.

Stockbridge has over the past 10 years developed a large and growing sustainable agriculture program, Sustainable Food and Farming. Over the last five years enrollment has tripled to 110 undergraduates, the largest such program in New England, and among the largest nationally. We collaborate with and support undergraduate and graduate programs in several other departments in the University, notably Environmental Conservation and Landscape Architecture & Regional Planning. We are presently engaged with Geosciences and Environmental Conservation in developing a School of Earth, Sustainability and the Environment, which promises to be a uniquely innovative program for students interested in sustainability, and further raise the profile of the University of Massachusetts Amherst as a leader in developing and practicing sustainable systems.

Within the University, no other department emphasizes outreach to agricultural businesses and organizations to the extent Stockbridge does. Outreach efforts in agriculture generally orient around specific crops or businesses, and Stockbridge's particular strengths lie in turf, apples, vegetables and landscape plants. Stockbridge faculty and affiliated Extension professionals lead most multi-state outreach efforts in New England, including on-farm research and demonstration projects, production guides and multi-state commodity meetings.

In these ways, Stockbridge works with the public, growers and students providing information on exploding interest in local, sustainably-produced food and managed landscapes. The green industries are surprisingly big business in Massachusetts, totaling over \$6 billion, with over 70% of those revenues coming from horticulture, including fruit, vegetable, greenhouse and nursery production and related businesses.

## **Destination of Choice: Undergraduate education**

### **1. Program Attractiveness and Competitiveness.**

***To what extent and in what ways does your department contribute to the “destination” goal, and to the campus’s overall attractiveness vis-à-vis competitor institutions?***

**Response.** The Stockbridge School of Agriculture is the only university in New England that offers both Associates and Bachelor’s degrees in agriculture. The School is well recognized for the progressive nature of its undergraduate programs, including creating new focus areas such as permaculture, herbal medicinals and sustainable farming and marketing. In addition to offering students an opportunity to gain hands-on experience, the program has a solid science foundation coupled with the liberal education of a major university. Excellent field laboratories, a new greenhouse complex, and a new laboratory building make Stockbridge the “go to” university for several agricultural majors, particularly Sustainable Food and Farming which is the largest of its kind in the nation.

The location of UMass in the heart of a sustainable agriculture “movement” in the Pioneer Valley provides students with easy access to some of the most progressive farms and marketing businesses in the U.S. This allows students access to internship and volunteer opportunities. Graduating Senior Survey data show that a very high percentage of Stockbridge students take advantage of these practical opportunities. In addition, students are supported in structured experiential opportunities such as the award winning Turf Club and the very popular Student Farm and Market. These opportunities could be strengthened and expanded by an investment in the Undergraduate Learning Center, which needs infrastructure development and personnel.

Classes offered at the Agricultural Learning Center to the both agricultural and non-agricultural students serve as recruitment mechanisms for the majors while generating income. Classes are under development in the areas of Conservation Bio-control, Clean Energy Technologies for Sustainable Agriculture, and Sustainable Farming and Food Systems. Additional classes will be offered as the infrastructure is developed at the Agricultural Learning Center.

Although the College, through the Center for Agriculture manages the Hadley Farm, classes offered in applied animal agriculture are currently limited to Animal Science majors only. An expansion of teaching facilities would allow access to other agricultural majors. The Stockbridge School supports the statement in the VASCI strategic plan which prioritizes an investment toward improving large animal facilities at the Hadley Farm. This includes the general physical plant, as well as lighted, heated and plumbed amphitheater classroom and laboratory area in which to conduct animal management classes safely without regard to weather and season

**2. Overall Program Effectiveness. How well is your department meeting the overall needs and expectations of your majors for a high-quality educational experience?**

**Response.** The Stockbridge School of Agriculture has excellent Graduating Senior Survey data results for both advising and career preparation. Each major has an experienced and dedicated adviser, committed to working with students on course selection and career development. In addition, students in the largest major, Sustainable Food and Farming, have a choice of taking the Integrated Experience General Education requirement and the Junior Writing requirement either with a diverse set of students in the College sponsored class or within a major specific class. Stockbridge is committed to offering additional Integrated Experience opportunities for the other majors as well.

Although the number of General Education students taught is down over the past few years, the School has a plan to offering new and progressive General Education classes, such as the Ecology of Food, Introduction to Permaculture, Botany for Gardeners, and an introduction class to the Stockbridge majors and disciplines. Courses in the Stockbridge School have very high satisfaction rating for students in the majors. To continue to improve, the School has also made a commitment to maintaining enrollments between 12 and 24 students for courses offered in the major. This will ensure efficient use of faculty time as well as allowing a close working relationship between faculty and students.

Following the restructuring of PSIS and voluntary reassignment of faculty members, Stockbridge was left with limited teaching capacity in the areas of entomology and applied ecology. In addition, access to critical classes in related CNS departments such as Food Science, Environmental Conservation, and Biology is often limited to majors only in those departments. Finally, there has been an increased demand for courses in applied animal agriculture but many Animal Science classes are restricted to majors only. We propose meetings to be arranged with other CNS departments to discuss these concerns.

The Stockbridge School supports the creation of the School of Earth, Sustainability and the Environment to increase both the attractiveness and the effectiveness of undergraduate programs at UMass Amherst. In addition, we support a new interdisciplinary undergraduate major focused on sustainability to meet the substantial and growing student demand for an academic program in this subject matter area.

**Destination of Choice – Graduate education**

***1. There are many excellent choices of colleges/universities in the country for someone seeking an MA or a PhD in your field. At present, what attracts graduate students to your department? What do you promise to provide them that makes the experience distinctive?***

The Stockbridge School of Agriculture is in a relatively unique position in terms of Graduate Education. The School does not have its own program, but participates in



interdepartmental programs: Plant Biology, Molecular & Cellular Biology, and Environmental Sciences. Students in these programs work primarily in six lab groups within the School on environmental and soil chemistry, phytoremediation of soils, environmental stress on plants, and sustainable agriculture. The fit of our students with the interdepartmental programs is often less than ideal. We are working with the programs to improve the experience for our students, specifically by developing options for requirements that better meet the needs of students who will be pursuing careers in applied agricultural and environmental research. It is critical that we improve program options in graduate education.

While a few labs maintain very strong research programs that engage graduate students from around the world, another issue that we must resolve is that many faculty members in the School simply do not run research programs. To some extent, this reflects the instructional needs and legacy of the Associates program, and in other cases, faculty at the end of their careers. It is imperative that the School develop a better balance between research and teaching, with more faculty involved in active, engaging research programs.

### **Ongoing Challenges and Recommendations – Undergraduate Education**

*The following bullet points represent the collective thinking of the faculty of the Stockbridge School of Agriculture. These recommendations were developed during four meetings of the faculty held in November 2014. An additional “looking in the mirror” document is currently being written and will be shared with the CNS Undergraduate Curriculum Committee once it is approved by the faculty.*

#### **Recommendations Requiring Discussions with Other CNS Departments**

1. *Meet with department heads and Chief Undergraduate Advisers of Food Science, Biology, Environmental Conservation and VASCI to identify duplication/overlap of classes and discuss access of students to classes currently restricted to majors only.*

**Rationale:** There appears to be duplication of subject matter offered by departments in the biological and ecological sciences. This should be examined and addressed.

Following the restructuring of PSIS and voluntary reassignment of faculty members, Stockbridge was left with limited teaching capacity in the areas of entomology and applied ecology. In addition, access to critical classes in other CNS departments is often limited to majors only in those departments. Finally, there has been an increased demand for courses in applied animal agriculture but many Animal Science classes are restricted to majors only. We propose meetings to be arranged with other CNS departments to discuss these concerns.

**Specifically** areas where discussions might be focused are:

- Biology – basic biology and botany, as well as genetics/plant breeding
  - Environmental Conservation – applied ecology and forestry
  - Animal Sciences – ANMLSCI 103 and applied husbandry classes
  - Food Science – food safety

2. *Discuss the need for investments in “field laboratories” used for teaching, particularly at the Hadley Farm and the Agricultural Learning Center. Investigate sources of funding in partnership with other departments using these facilities.*

**Rationale:** Although the College, through the Center for Agriculture manages the Hadley Farm, classes offered in applied animal agriculture are currently limited to Animal Science majors only. An expansion of teaching facilities would allow access to other agricultural majors. The Undergraduate Agricultural Learning Center is intended to provide opportunities for students from across the university. These facilities need to be enhanced to provide more access to non-majors.

**Specifically:**

We support the statement in the VASCI strategic plan which prioritizes an investment toward improving large animal facilities at the Hadley Farm. This includes the general physical plant, as well as lighted, heated and plumbed amphitheater classroom and laboratory area in which to conduct animal management classes safely without regard to weather and season.

The Undergraduate Agricultural Learning Center has begun to develop infrastructure to support the teaching program but needs additional investment. Current and planned programs (and needs) include:

- UMass Student Farm (fencing, storage, greenhouses, equipment sheds)
- Food for All Garden Project (secure storage)
- Pollinator Habitat Garden (secure storage)
- New Micro-Farm Greenhouse and Demonstration Facility
- General classes for undergraduates (classroom and wet lab)

3. *Establish the School of Earth, Sustainability and the Environment to increase both the attractiveness and the effectiveness of undergraduate programs at UMass Amherst.*

**Rationale:** UMass Amherst offers a wide array of academic programs in earth, sustainability and environmental sciences. Yet these programs reside in different departments across the campus and are largely uncoordinated. The School would unify programs and provide the framework to:

- Improve program effectiveness for our students (retention, graduation timeline etc.)
- Maximize attractiveness to prospective students
- Create cohesion across our undergraduate programs
- Improve our capacity to develop new and expand existing interdisciplinary programs

**Specifically:** The School would be established within the College of Natural Sciences to serve as the central hub for academic programs in earth, sustainability and environmental sciences.

- Focus on undergraduate programs
  - Including single unit majors and interdisciplinary majors
  - Participating majors may include: Building & Construction Technologies, Environmental Science, Geography, Geology, Natural Resources Conservation, Sustainable Food and Farming, and Sustainable Horticulture.
- A creative partnership with multiple units from across campus. Partnering units could contribute to the School in one of two ways:
  - Lead Unit: individually or jointly administer a degree program
  - Supporting Unit: offer elective courses related to earth, sustainability and environmental sciences.

4. *Develop a new interdisciplinary undergraduate major focused on sustainability to meet the substantial and growing student demand for an academic program in this subject matter area.*

- By creating a new undergraduate program in sustainability, UMass Amherst will be the “destination of choice” for prospective students in the Northeast and beyond. In several recent national Princeton Review Polls, over 60% of prospective college-bound students indicated that an institutions commitment to sustainability issues contributes to decisions to apply to or attend a school.
- To capitalize on this large and growing demand from college-bound students, we propose to develop a new interdisciplinary undergraduate major in sustainability in collaboration with partner units in the proposed School of Earth, Sustainability and the Environments, described above.

***Internal Recommendations Requiring No (or Little) New Investment***

5. *Reduce the number of small undergraduate classes taught by tenure track faculty and increase the number of large General Education classes*

**Rationale:** we need to use resources (faculty time) wisely AND increase the number of students taught AND enhance access to faculty (meaning reasonably sized classes) which improve the student experience. This might be achieved by increasing large service GenEd’s, reducing the number of undergraduate classes with less than 12

students, and offering classes on alternate years to ensure that courses in the major have about 25 students.

**Specifically** we plan to:

- Offer STOCKSCH 100 - Botany for Gardeners again
- Make STOCKSCH 197P - Introduction to Permaculture a GenEd
- Increase enrollment in STOCKSCH 120 - Organic Farming and Gardening
- Ask the director to review the need for classes taught with less than 12 students
- Restructure the A.S. program to allow more flexibility
- Introduce more hand-on experience lab and field courses
- Create a new GenEd (I) class for first year students which introduces the diverse disciplines supported by the Stockbridge School of Agriculture

*6. Develop summer opportunities for applied agriculture classes*

**Rationale:** Classes offered at the Hadley Farm and the Agricultural Learning Center to the both agricultural and non-agricultural students will as serve recruitment mechanisms for the majors while generating income.

**Specifically** – summer classes are currently being planned for:

- Conservation Biocontrol: farming with beneficial insects
- Clean Energy Technologies for Sustainable Agriculture (with HCC)
- Equine Management (summer college)
- Sustainable Farming and Food Systems (summer college)

*7. Offer summer professional development classes for high school teachers*

**Rationale:** This would serve as a recruitment mechanism for high school students while generating income.

**Specifically** – Classes are currently being offered for vocational agriculture instructors and in the area of community-based education. Discussions have begun to offer modules for high school science and horticulture teachers in the areas of:

- Horticulture and greenhouse management
- Equine management
- Genetic Modification of Plants
- Sustainable Agriculture
- Emerging issues in Agriculture such as Climate Change

*8. Provide more support for undergraduate students as they work toward a career*

**Rationale:** the Chancellor is committed to “student success”. This includes both retention and job placement. Senior Survey data is one of the criteria being used.

**Specifically** – we are currently offering:

- An introduction to the major seminar in Sustainable Food and Farming (SFF) which introduces students to the culture and values of the major, internship and career opportunities, helps them to select classes, and allows them to meet seniors and graduate of the program who have been successful.
- We should offer a freshman seminar for students not in the Sustainable Food and Farming major
- Seniors are given the opportunity to participate in the undergraduate research conference as part of the Sustainable Food and Farming capstone class. Approximately 20 graduating SFF seniors participate each year. More students should take advantage of this opportunity.
- The Turf Club offers a forum for professional development and national recognition. This should be expanded to Horticulture students.
- We should offer additional student enterprise opportunities such as the Student Farm in other majors
- Develop a system for introducing students to research (both lab and field) early in their career

#### *9. Create a bachelor's degree in Equine Management*

**Rationale:** currently the rapidly growing A.S. major in Equine Management sends students to BDIC for a B.S. degree. We need to maintain a strong equine program to support this important economic driver in Massachusetts agriculture. To be successful we need to strengthen the equine assisted therapy, leadership and community building aspects of the Equine program.

#### *10. Reposition our Turfgrass Science and Management and Sustainable Horticulture majors as a way to provide ecosystem services for the public good*

**Rationale:** Enrollment in the Sustainable Horticulture major is steady but not reaching its potential. Enrollment in the Turfgrass Science and Management major is in a steady decline. It is imperative that we present these two traditional majors in a way that attracts progressive leaders in these industries.

**Explanation:** These industries represent a major economic driver in Massachusetts as well as significant acreage. Landscape ecologists view open space and managed landscapes as a means of providing ecosystem services to the public. The Millenium Ecosystem Assessment Report names several categories of services that could be provided by a well-managed turf or landscape enterprise. For example:

- Biodiversity
- Carbon sequestration
- Water and air purification
- Waste decomposition and detoxification
- Soil health and biochar

*11. Creatively reposition our PSIS major to attract more students*

**Rationale:** This major has very few students. We need a new strategy to build enrollment. While students can focus on basic sciences and graduate school preparation in the other three majors, this major should attract students less interested in a commodity or production focus.

**Specifically:** We need a more aggressive campaign to make other students in CNS aware of this applied biology and applied ecology option. We need to:

- Rename the PSIS major
- Introduce more hands-on experience for students in this major

***Internal Recommendations Requiring a Reallocation or Investment***

*12. Address the current weaknesses in our educational offerings.*

**Rationale:** The restructuring of PSIS and unfilled retirements has created a situation in which there are several disciplinary weaknesses.

**Specifically** we might consider the following:

- More classes in applied ecology
  - Teach Agroecology every year
  - Add classes or negotiate with ECO to offer entomology and biocontrol
  - Applied physiology in the areas of turf and greenhouse are strong but there is a gap in the area of applied physiology in food crops – review how current classes are offered and consider restructuring course offerings especially those with low enrollment
- We are currently weak in plant genetics, plant breeding and the practical aspects of seed selection and saving. This is an opportunity to attract new students.
- Add classes in business management, marketing and finance or improve access to suitable classes taught by other departments
- New classes with an urban and particularly a soil health (in urban areas) focus are needed perhaps with financial support from state government
- Classes and study abroad opportunities to support the international certificate
- Build our capacity in teaching integrated plant/animal agriculture by offering new classes and/or gaining access to Animal Science classes for our students
- Classes are needed in post-harvest handling of fruits and vegetables, woody and landscape horticulture, and organic turf management
- We need additional courses in food safety

*13. Strengthen the offerings in herbal medicine and create a certificate*

**Rationale:** the interest in students for holistic health and herbal medicine continues to grow. Currently we only offer one class in this area that is taught by a tenure track faculty member. Other instructors are part-time or volunteers and generally offer one or two credit special topic classes. To create a certificate, the Faculty Senate requires more “regular” classes.