

HSU Academic Program Criteria

Academic Program in Botany

I. The Vision for Humboldt State University (Limit: 2 pages) [15%]

Describe up to 5 curricular or co-curricular features of the program that are consistent with the Vision of HSU, and indicate which aspect(s) of the Vision align with that particular feature. Please provide sufficient information such that an individual unfamiliar with your program will clearly understand the feature's relevance.

The curricular features of the Department of Biological Sciences, with its Biology, Botany and Zoology majors, as well as its large graduate program, provide outstanding support for the core visions of HSU. We have a long-standing reputation as a comprehensive department focused on understanding the diversity of living organisms and how they interact with each other and their environment. This major function of our curriculum is a fundamental pre-requisite for scientifically informed, environmentally responsible action.

Humboldt State University is the campus of choice for individuals who seek to improve the human condition and our environment. Our department provides the greatest breadth of biological training at HSU for learning about life on the planet and how to study it. Our courses cover the diversity of all life, including human biology. By learning about how bacteria, fungi, algae, plants, and animals live, and the environmental processes that affect them, students receive the foundation necessary for them to improve the condition of all life.

We are a premier center for the interdisciplinary study of the environment and its natural resources. Our required lower-division courses are unique among other biology departments in the nation in that they provide students with a broad foundation across disciplines. Subject coverage includes math, statistics, chemistry, physics, biology, botany, and zoology. Inclusion of the latter two subjects provides a greater breadth of biology training than is typical for other biology departments. This interdisciplinary content of our courses is designed to support students who are interested in the organisms and the environment.

Other high quality resources used in our curriculum enhance the interdisciplinary opportunities for our students, and also benefit community members and visiting scholars. The department's Greenhouse and Herbarium contain teaching and research collections of plants from all over the world, and are both the largest and most diverse of their kind in the CSU system. Over 500 students from all over the campus directly use these facilities each year. Our department's Biotechnology Core Facility

makes it possible to study, from a genetic perspective, the ecology and evolution of all botanical forms of life. This is the only facility of its kind at HSU and is used by students and faculty in several other departments (e.g., Wildlife, Fisheries, Anthropology).

We believe the key to our common future will be the individual citizen who acts in good conscience and engages in informed action. The Department of Biological Sciences equips students with critical thinking skills necessary for making scientifically informed decisions, and taking informed action. Specifically, our department's lower division courses teach critical thinking skills and the application of the scientific method, both necessary for answering environmental and health-related questions. Lower division students test hypotheses of, for example, plant and animal evolution, cell function, and disease ecology. Larger scale and more rigorous application of the scientific method occurs in upper division courses, and becomes even more student driven in senior theses (BIOL 490) and graduate student theses. A wide variety of skills are taught during the application of the scientific method, including written and oral presentation skills, experimental techniques for lab and field, and a variety of approaches for analyzing and presenting data. Undergraduate in our department are involved in a level of research training reserved for graduate students at other universities.

We are committed to increasing our diversity of people and perspectives. Our department is dedicated to providing hands-on, active learning opportunities to diverse students and community members, and to supporting and mentoring underserved populations. More than \$5 million has been awarded in the past 12 years for this purpose. For instance, the National Science Foundation's (NSF) Louis Stokes Alliance for Minority Participation Program includes support for a program designed to recruit, train and support local Native Americans interested in biomedical sciences. This program funds summer training and mentoring of high school students from Native American communities, to encourage them to attend college and study science. Students in this program have successfully graduated from HSU and entered medical schools and Ph.D. programs. The NSF Research Experience for Undergraduates program, initiated in 2004 and ongoing through 2012 at HSU, is targeted at groups under-represented in the sciences, and provides funds for 10-12 students from around the country to participate annually in a faculty-mentored summer research project focused on Ecology and Evolution.

We are stewards of learning to make a positive difference. Biological Sciences is one of the premier departments in California for training teachers in the life sciences. The Redwood Science Project (RSP), initiated by botanists Dr. C. Lu, J. White, and zoologist J. DeMartini enhances the quality of K-12 science and math instruction in seven counties by training ~60 teachers per year. This

includes program development and evaluation, research on science teaching, and professional development opportunities. Research projects identify factors influencing students' decisions to join the teaching profession. Professional development opportunities include Summer Institutes in Math and Science, which bring together groups of K-12 teachers at HSU for science training. Diverse endeavors of the RSP include the Northcoast Mathematics and Science Initiative and the Redwood Area Academic Literacy Initiative.

Additionally, the Howard Hughes Medical Institute grant to Dr. Jacob Varkey has employed exceptional undergraduates to teach weekly review sessions for a wide range of CNRS courses, including botany, zoology, and biology in our department. These supplemental instructors are mentored by the faculty associated with each course, and the students in the courses benefit from an advanced level of tutoring. Finally, our graduate students gain exceptional teaching skills. They are required to enroll in a teaching assistant training course and they get weekly mentoring from the faculty in charge of the course for which they teach.

II. Demand (Limit: 1.5 pages per option, not including tables) [20%]

A. Internal demand for the degree program and courses in the degree program

I. Headcount Data

Major Academic Year (Fall/Spring) Average Headcount Summary Majors_overview_BOT report generated: 16-APR-08									
Major Code	Major Description	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BOT	Botany	74	78	79	73	79	80	74	86
Total		74	78	79	73	79	80	74	86

Second Majors by Academic Year (exclusive of primary majors) Majors_overview_BOT report generated: 16-APR-08									
Major Code	Major Description	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BOT	Botany	11	12	11	8	10	7	6	7
Total		11	12	11	8	10	7	6	7

Minors enrolled AY Average in Botany minors_enrolled_BOT report generated: 06-MAR-08								
CLASS	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Frosh	1	1	1	0	1	0	0	0
Soph	2	0	4	1	0	1	0	0
Jr	3	2	2	5	3	2	2	0
Sr	19	16	15	12	14	16	15	12
Grad	0	0	0	1	2	1	0	0
	24	18	21	19	19	19	17	12

Majors by Sex and Ethnicity									
Majors_overview_BOT report generated: 16-APR-08									
SEX	Ethnicity	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Female	Asian	0	1	2	2	4	3	2	3
	Black	0	1	1	1	1	1	0	0
	Hispanic	3	2	2	3	2	3	2	0
	Native Amer	0	1	1	3	3	2	2	3
	White	34	36	35	26	25	24	22	28
	Other	2	1	2	1	4	3	5	4
	Unknown	5	6	10	6	8	8	8	8
sum		43	48	52	42	45	42	41	44
Male	Asian	0	1	0	1	1	1	2	3
	Black	1	0	0	0	1	1	1	0
	Hispanic	1	1	1	2	2	1	2	4
	Native Amer	0	0	0	1	0	0	0	1
	Pacific Is	0	0	0	0	0	0	0	1
	White	22	21	20	22	23	27	20	27
	Other	2	2	2	1	2	1	2	2
	Unknown	6	7	4	5	6	9	8	5
sum		31	31	27	31	34	38	34	42

Botany (with options) Degrees Awarded (incl. primary and second majors)								
degrees_awarded_B_BOT report generated: 25-JUN-08								
MAJOR	AY 99/00	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07
Botany	19	15	21	15	14	13	22	12
sum	19	15	21	15	14	13	22	12

Botany Degrees Awarded by Sex and Ethnicity (incl. primary and second majors)									
degrees_awarded_B_BOT report generated: 25-JUN-08									
SEX	Ethnicity	AY 99/00	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07
Female	Asian	0	1	0	0	1	0	2	0
	Hispanic	0	0	2	0	1	1	0	1
	White	6	4	7	9	4	3	8	6
	Other	2	0	0	0	0	1	2	0
	Unknown	4	6	0	0	1	4	3	0
sum		12	11	9	9	7	9	15	7
Male	Asian	0	0	0	1	1	0	0	0
	Hispanic	1	1	1	0	0	1	0	0
	White	6	0	9	4	5	3	5	3
	Other	0	0	0	0	1	0	0	0
	Unknown	0	3	2	1	0	0	2	2
sum		7	4	12	6	7	4	7	5

Minors Awarded by Year in Botany								
minors_awarded_BOT report generated: 25-JUN-08								
MINOR	AY 99/00	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07
Botany	7	12	9	10	8	11	10	9

2. FTES by Course Code

FTES taken in Botany classes by Majors (AY 02/03 - AY 07/08)									
course_ftes_smry_BOT report generated: 30-JUN-08									
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08	
BOT	Lower-div	Biology	16.0	17.2	17.1	16.3	14.5	16.7	
		Wildlife	8.3	8.3	7.9	8.9	7.3	8.4	
		Nat Resources Plng & Interptn	4.8	3.9	4.7	3.9	4.7	4.5	
		Environmental Science	4.1	2.9	3.3	2.7	2.1	4.1	
		Forestry	5.9	3.6	3.2	5.1	4.1	4.0	
		Zoology	4.9	3.1	5.6	4.7	4.1	3.3	
		Undeclared	2.7	4.3	2.5	4.0	2.7	2.4	
		Botany	2.0	2.7	2.0	2.4	1.7	2.1	
	Sub-total		56.7	55.5	55.6	57.3	52.5	58.2	

FTES taken in Botany classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_BOT report generated: 30-JUN-08								
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
	Upper-div	Botany	14.8	13.3	12.6	13.2	11.0	12.2
		Biology	20.7	18.1	19.6	17.9	13.4	10.8
		Wildlife	15.0	11.4	13.1	13.5	12.6	10.3
		Zoology	3.6	3.6	4.2	3.1	3.1	2.1
		Environmental Science	1.6	1.1	2.2	1.9	1.5	1.4
	Sub-total		72.1	64.9	77.1	59.0	52.1	41.1
Total			129.6	121.9	135.6	117.4	105.6	99.3

FTES taken in Botany classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_BOT report generated: 30-JUN-08								
SUBJ	Course level	Student Major	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
BOT	All Levels	Biology	36.8	35.9	37.6	34.6	27.9	27.5
		Wildlife	23.5	19.7	21.2	22.4	20.0	18.7
		Botany	17.0	16.1	15.4	15.6	12.7	14.3
		Environmental Science	5.7	4.1	5.6	4.5	3.7	5.5
		Zoology	8.5	6.7	9.8	7.8	7.3	5.4
Total			129.6	121.9	135.6	117.4	105.6	99.3

3. Service to other HSU program/options

Document other HSU programs/options (including, GE) with required coursework from your program

Other HSU program/option name	Courses required List course number and units	Restricted elective courses List number and units
Lower Division Area B GE		Campus choice, BOT 105 (4), General Botany
Upper Division Area B GE		Campus choice, BOT 300 (3), Plants & Civilization
Biology: Cellular/Molecular	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology
Biology: Ecology	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology BOT 350 (4), Plant Taxonomy BOT 353 (4), Phycology BOT 354 (4), Agrostology BOT 355 (4), Lichens & Bryophytes BOT 358 (2), Biology of Microfungi BOT 359 (2), Biology of Ascomycetes and Basidiomycetes
Biology: Environmental	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology BOT 321 (4), Developmental Plant Anatomy

		BOT 350 (4), Plant Taxonomy BOT 353 (4), Phycology BOT 354 (4), Agrostology BOT 355 (4), Lichens & Bryophytes BOT 360 (4), Biology of Fleshy Fungi BOT 372 (4), Evolutionary Morphology of Plants BOT 394 (3), Forest Pathology BOT 458 (3), Pollination Biology BOT 553 (3), Marine Macrophyte Ecology
Biology: General	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology The 15 additional upper division units could include any upper division BOT course.
Biology: Marine Biology	BOT 105 (4), General Botany BOT 353 (4), Phycology	BOT 310 (4), Plant Physiology
Biology: Microbiology	BOT 105 (4), General Botany BOT 358 (2), Biology of Microfungi	BOT 310 (4), Plant Physiology
Biology: Special Major	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology The 30 additional upper division units could include any upper division BOT course.
Chemistry (BS) - BioChemistry		BOT 105 (4), General Botany BOT 310 (4), Plant Physiology
Environmental Science	BOT 105 (4), General Botany BOT 350 (4), Plant Taxonomy	BOT 330 (3), Plant Ecology
Forestry		BOT 105 (4), General Botany BOT 394 (3), Forest Pathology
Natural Resources Planning & Interpretation	BOT 105 (4), General Botany	BOT 300 (3), Plants & Civilization BOT 330 (3), Plant Ecology BOT 350 (4), Plant Taxonomy BOT 354 (4), Agrostology BOT 450 (3), Adv. Plant Taxonomy
Rangeland Resource Science	BOT 105 (4), General Botany BOT 310 (4), Plant Physiology BOT 350 (4), Plant Taxonomy	BOT 330 (3), Plant Ecology
Wildland Soil Science	BOT 105 (4), General Botany	BOT 310 (4), Plant Physiology BOT 350 (4), Plant Taxonomy BOT 354 (4), Agrostology
Wildlife	BOT 105 (4), General Botany BOT 330 (2), Plant Ecology BOT 350 (4), Plant Taxonomy	
Women's Studies	BOT 300 (3), Plants & Civilization	
Zoology	BOT 105 (4), General Botany	Any upper division BOT course w/ lab

4. Comment on the internal demand **FOR EACH OPTION** of the Major. Explain any significant changes in internal program demand over past 7 years. Provide any additional relevant information of internal demand.

Botany

Internal demand for the major continues to increase (91 majors as of F08). Other programs in CNRS demand BOT courses. The greatest proportion of major students are female (50-70%); the percent of non-white majors varies across years (25-54%). Increases in internal demand therefore do not correlate to sex or ethnicity. FTES has declined since 05/06 due to a loss of BOT faculty teaching power (1 botany faculty member left the department, there were 4 semesters of sabbatical and 2 semesters of leave). The absence of these faculty during 07/08 resulted in our lowest FTES since 02/03. This meant that upper division BOT courses either could not be taught, or not taught as often, and large FTES courses like BOT 300 could not be offered. In addition, the BOT major has lost FTES due to the forced cancellation of BOT electives. The decrease in FTES is not due to a decrease in demand.

Botany Minor

The Botany Minor provides an important service through advanced botanical training for students majoring in Biology and other disciplines. Since AY 00/01 an average of 19 students/year were enrolled in the Botany minor; on average 44% were Wildlife majors.

B. External demand for “graduates” from the program

Imagine you are answering a parent’s question about job prospects and the demand for graduates of your program/option. Describe evidence of external demand for this program. Evidence may be cited from one of the following sources: the State of California <http://www.labormarketinfo.edd.ca.gov/>, the US Department of Labor <http://www.bls.gov/OCO/>, the National Association of Colleges and Employers, <http://naceweb.org>. Evidence may be cited from an additional source from, for example, a professional society relevant to your discipline.

Botany

Demand drivers: Demand for botanists is driven by (1) the growing world population which continues to increase the need for better food supplies; (2) environmental problems, such as air, water and soil pollution, global warming; (3) the search for new drugs and useful genes for improving crop plants; (4) the need for increasing numbers of botanically educated people to address these issues. ***Demand data:*** Data from numerous sources clearly indicate that demand for biology graduates (including botanists) will continue to increase by 25-30% until 2016, with the highest expected increases nationwide in the environmental, biotechnology, and education fields. [Sources: California State Labor Market Division, *California Labor Market and Economic Analysis 2007*; US Department of Labor, *Occupational*

Outlook Handbook 2008-2009 and Occupational Information Network]. **Diversity of careers:** One of the best aspects of botany is the number of different specialties and career opportunities available. This diversity allows people with different backgrounds, aptitudes, and interests to find satisfying careers in botany. More than many other scientific fields, botany continues to provide opportunities for women as well as men. **Employers:** Federal agencies. Botanists work in the U.S. Department of Agriculture, in the Medical Plant Resources Laboratory, Germplasm Resources Laboratory, Animal and Plant Health Inspection Service, National Arboretum, and the U.S. Forest Service. Other federal agencies employ botanists including the National Park Service, Bureau of Land Management, U.S. Geological Survey, Environmental Protection Agency, and Public Health Service. Similar state level agencies also employ botanists. Industry. Biotechnology and drug companies, the chemical industry, lumber and paper companies, seed and nursery companies, fruit growers, food companies, fermentation industries (including breweries), and biological supply houses, all hire people trained in botany. Educational institutions which employ botanists include high schools, community colleges, and universities. Environmental organizations like the Nature Conservancy, also hire botanists. **Salaries:** Botanists are an important part of the biologically trained work force. Salary surveys by the American Institute for Biological Science (2003) estimate the median income for people trained in biology with less than one year of experience at \$33K, and for those with 30 years or more at \$108K. The median for all positions without supervisory responsibilities was \$48K and for those supervising \geq 10 professional employees \$127K. Overall, the field of life sciences has a mean annual salary of ~\$65K (US Bureau of Labor 2005; California Labor Market report 2008). Biologists in private industry may earn salaries $>$ \$80K, while those working in government, academia, and the nonprofit sector earn \$60-70K. Those with over 30 years of experience have a median salary of ~\$103K. **HSU Botany graduates are highly sought after** due to their extensive laboratory and field training, and hands-on identification and research experiences that are typically obtained only in graduate programs at other universities. Traditional employers of our graduates are local and regional branches of the US Fish and Wildlife Service, US Forest Service, Bureau of Land Management, California Department of Fish and Game, as well as national and state parks. Our Botany graduates are also employed by private consulting firms providing, for example, surveys for rare plants and environmental impact assessment.

Botany Minor

Students who minor in Botany increase their employability in a number of fields requiring botanical training. For example, Wildlife graduates can only qualify for federal employment as a "wildlife biologist" with a minimum of 9 units of botany; many meet or exceed these requirements through a Botany Minor and take courses directly applicable to the wildlife profession, such as Plant Taxonomy (BOT 350), Plant Ecology (BOT 330), and Forest Pathology (BOT 394). Dr. Matt Johnson, chair of the Wildlife Department, states: "We in Wildlife are very grateful that there are Botany courses offered at HSU that have applications immediately relevant to working wildlife biologists".

III. Program Quality (Limit: 6 pages, not including tables) [30%]

A. Students

1. For undergraduate programs

Botany (with options) Mean GWPE Scores (incl. primary and second majors) degrees_awarded_B_BOT report generated: 25-JUN-08								
MAJOR	AY 99/00	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07
Botany	16.2	17.4	17.4	17.0	16.6	16.6	17.6	17.3
Overall	16.2	17.4	17.4	17.0	16.6	16.6	17.6	17.3

Provide evidence indicative of program quality related to student learning (e.g., patterns of student achievements in discipline-specific contexts such as special honors or awards, publications, presentations; passing rates on professional examinations; proportion of students who are admitted to graduate school and/or employed in a disciplinary field; and so on – as appropriate for your discipline).

Student Scholarship: The quality of our Botany Program is reflected by the experiences and successes of our students. Students participate in a wide variety of scholarship activities. Due to our commitment to one-on-one mentoring and to providing experience-based learning, our students regularly participate in national and international scientific meetings, and co-author papers. **Student Presentations and Publications:** Over the past five years >35 Botany undergraduates attended conferences as co-authors on poster and oral presentations, being recognized at these meetings for the quality of their work. Additionally, eight students have co-authored with faculty on peer reviewed articles in major scientific journals, an exceptional achievement at the undergraduate level. **Student Awards:** Three undergraduate research students recently won the Botanical Society of America (BSA) Young Botanist of the Year Award (A.Oldham 2006; R.Tate 2007; S.McDonald 2008), and a Best Student Presentation Award (BSA; A.Oldham 2008). **Student Employment and Advanced Study:** For details, see II.1.A. One outstanding example is Heather Mehl, *cum laude* graduate in Botany (2006), currently as a Level 1 Research Biologist in the Plant Pathology Department, UC Davis. Over the past five years, at least 25% of our Botany majors have gone on to pursue graduate studies. **Unique Scholarship Opportunities:** Nine undergraduates recently had field research experiences on expeditions to the tropical rainforests of Guyana. Five completed senior theses on these expeditions, and two co-authored publications. Students currently conduct studies on plant fossil research collections from the Smithsonian Institution and other major U.S. museums. Over the past three years,

54 undergraduates have been hired on faculty grants, gaining valuable hands-on laboratory and field training.

B. Faculty

1. Provide evidence of teaching effectiveness and commitment to continuous improvement of teaching. Include, for example, engagement in professional development for teaching (including around campus themes on learning outcomes and diversity, and on accessibility training), program approaches to ensure quality, and/or recognitions, honors, and awards for excellence in the classroom as appropriate for your program.

New Learning Styles: Botany faculty utilize of modern digital classroom technologies. Innovative means of engaging students include using student response clickers in large lecture settings, online forums for student discussions, and group learning approaches in lecture, lab, and field. **Professional Development:** Botany faculty have participated in workshops on active learning methods, digital learning techniques, strategies for large lectures, the HSU Faculty Accessibility Institute, Spring Teaching Showcase, and California Teachers Association Conferences. Botany faculty consult student and faculty evaluations to develop and fine-tune their courses. **Scholarship:** Botany faculty are actively engaged in scholarship and bring recent scientific discoveries to bear in their courses. The relevance and vitality of the botanical sciences is thereby emphasized in the classroom and keeps our students well informed and excited.

2. Evidence of faculty engagement in scholarship/creative activities and service. (Express as a percentage of full-time or FERP faculty members **affiliated with the program**. For example, if 9 of 10 faculty affiliated with your program gave a paper at a professional meeting in 04/05, then enter 9/10 = 90%.) This table is to be completed by the department.

Scholarship/Creative Activities/Service	05/06	06/07	07/08
At least one peer-reviewed publication or creative product	50%	75%	75%
At least one funded grant or contract related to scholarship	87.5%	75%	87.5%
Invited participant or leader of workshops, expert panels, or task forces	12.5%	25%	25%
At least one presentation (paper, poster, exhibition, etc.) given at a professional society meeting	50%	62.5%	75%
Professional service activities at a	62.5%	50%	62.5%

regional or national level			
Service on at least one university or college-level committee (at least 1 hour/wk avg.)	50%	50%	50%

3. Provide explanations of the data above and/or descriptions of the patterns of faculty engagement in scholarly and/or creative activities and service as appropriate for your program.

Publications and Grants: Each of the eight Botany faculty secured research funding in at least 1 of the 3 years; at least 75% were funded in each year. Total funding was \$4,470,965; if spread evenly this comes out to \$186K/faculty member/year. 59% of this funding was related to Science Education (see sect. VI). Resulting scholarly productivity was evidenced by at least 50% of the Botany faculty having ≥ 1 peer-reviewed publication per year, with the total number over the three years being 50 (2.1 publications/faculty member/year). More than 50% of our botanists presented their research at professional meetings each year, for a total of 69 conference presentations (2.9 presentations/faculty member/year). **Community, Professional, and University Service:** Botany faculty have performed over 79 acts of service to the community (3.3 events/year/faculty); 54% of these presentations, fieldtrips, etc., were based on invitations from the community. Over half provided professional and university or college level service in each of the three years. Faculty review manuscripts, book chapters, and grants (20/3 years), sit on workshops, expert panels, and task forces (16), and chair committees (3) in professional societies.

4. Provide evidence for faculty mentoring of students. Include, for example, approaches to advising, directed study or research, and/or clubs or student professional chapters that involve faculty mentorship.

Advising: Individual Botany faculty have >40 advisees. Advising techniques vary but the unifying theme is plenty of one-on-one interaction with students in guiding them through their educational experience. Our goal is to help students reach their academic potential and enjoy their multi-faceted experience at HSU. **Student Clubs:** Several of the faculty are advisors or regularly engage in activities with student clubs including the Mycology Club, Fire Ecology Club, Botany Club, Native Plant Club, and Naturalist Club. **Experiential Learning:** Botany courses involve experiential learning in field- and lab settings. This allows for one-on-one student/faculty interaction. Moreover, students are writing and presenting their findings and getting individualized feedback. **Capstone Experiences:** Over the three year period the Botany faculty have mentored 112 senior thesis/directed study students (BIOL

490/499), for an average of 4.7 students/faculty member/year. All Botany majors are required to complete such projects and interact closely with individual faculty on their design and execution. Such projects often involve laboratory and field-based data collection, at local, regional, and international study sites, and some have recently led to student co-authored peer-reviewed publications.

5. Other evidence of quality indicators related to faculty that may not be listed elsewhere, including, for example, faculty diversity within the program.

Faculty Awards: Alistair McCrone Promising Faculty Scholar (Jules, 2003; Henkel 2005).

C. Curriculum (differentiate by option, if appropriate)

1. Writing and oral communication learning outcomes

Describe how written and oral communication skills are included in your program.

We equip students with a sound academic and practical foundation for productive participation in a society. Faculty are committed to improving student communication skills. Frequent individual writing assignments incorporating assessment and feedback, are regular components of our courses. ***In larger, lower division courses writing assignments are 2-5 pages.*** For example, in Botany 105, students receive a scoring rubric beforehand, write 2-5 page Botanical Explanatory Essays, and receive feedback from the instructor and written comments on drafts of the essays, and also student peer review. ***In upper-division courses more diverse approaches to written assignments are taken,*** including peer and instructor review followed by revision and resubmission. For example, in BOT 353 students write draft research proposals that are reviewed and resubmitted twice before acceptance of the final draft. In BOT 321, BOT 372, and BOT353, students write scientific papers reporting their independent research. These go through extensive review and revision. ***Students deliver oral and poster presentations,*** on which they receive feedback and are graded. A number of the posters prepared for courses (such as BOT 353) have been delivered at professional meetings. In BOT 360 and BOT 394 students interpret fungal ecology and forest pathology in field settings with the instructor and take quizzes and exams in oral format.

2. Assessment

[Data on program progress with assessment tasks will be provided from the Faculty Associate for Assessment]

Progress: The Biological Sciences Department is current on all assessment activities associated with WASC accreditation. Four of the Department's 5 learning outcomes have been assessed, primarily by using assessment questions embedded in the final exams of 3-4 upper division courses/semester. The assessment questions are pre-approved by the Department Curriculum Committee.

Provide 2 examples of how you have used results of assessment of your program's student learning outcomes to adapt, enhance, or affirm your program's curriculum.

- Fall 2007 assessment indicated our students could accurately interpret graphs, tables and diagrams, with ~72% of the students earning 67% or more of available points. This affirmed ongoing curricular changes toward active learning approaches in several courses, including BIO105 and BIO330. We have initiated curricular changes to focus on similar skills in our large BIO 104 GE course, going from 2 to 3 h of lecture + 3 h lab in order to introduce active learning strategies in the extra lecture hour. However, this curricular change has not yet been approved by the Vice-Provost.
- Recent assessment indicated that student ability to formulate hypotheses was not as advanced. Nearly 50% of our students earned 67% or more of available points on the embedded final exam questions. At a Departmental retreat (8/08) we determined that an emphasis in our lower division curriculum of factual content, as opposed to specific student skill sets, may contribute to a weakness in applying the scientific method. We agreed to increase emphasis on hypothesis development and testing in lower division courses. In upper division courses a similar emphasis will incorporate development and evaluation of experiments to test alternative hypotheses

3. Accreditation (if applicable)

If the program is accredited, describe the need for this accreditation and its impact on the quality and composition of the curriculum of the program.

N/A

4. Relevance and innovation

Provide evidence through examples that demonstrate a curriculum that is relevant, innovative, forward looking, responsive to changing trends, and equips students to function in a diverse, global context.

Botany is global: Knowledge of plants, fungi and algae can be applied by anyone, anywhere in the world. Therefore lecture and lab material in all Botany courses includes topics of botanical interest from all over the world; students become versatile with a broad range of research directions relevant to

functioning in a diverse global context, as indicated below. **Mycology:** Mycology courses employ modern approaches to fungal systematics, and focus on emerging plant diseases, with students acquiring field and laboratory skills to work in these transnational issues. Students acquire skills relevant to mushroom cultivation and fungal bioremediation which are emergent fields with high economic potential. **Plant Ecology:** Numerous quantitative tools are taught that are useful in the work-world of plant ecologists. Examples include population viability analysis and gradient analysis. **Plant Physiology:** Students must ask questions, apply analytical techniques to answer their questions, and present their findings. This is what scientists do, and for each semester the questions are different, reflecting the current state of the world/society. Phytoremediation of polluted soils, a rapidly emerging biotechnology tool, is also studied. **Plant Taxonomy:** Course content remains current with a "willingness to experiment" as an innovation. Students learn plant sampling and identification skills that are highly relevant in this era of heightened environmental concern. Training competent field botanists is forward looking and responsive in light of the global biodiversity crisis. **Plant Anatomy and Morphology:** Course innovations combine instruction on modern genetic developmental pathways within a framework of descriptive anatomy and the emerging field of modern evolutionary developmental biology, and involve students intensively in hands-on phylogenetic methods and application of the scientific method. **Phycology:** Phycology students investigate the photosynthetic organisms (algae) at the base of the planet's aquatic ecosystems. Undergraduate students have generated 10 years of data on algal communities of Humboldt Bay, and they test hypotheses and write extensive term papers on effects of aquatic and atmospheric climate changes on marine organisms.

5. Interactions between graduate and undergraduate programs (if applicable)
If this is a graduate program, what opportunities for undergraduates result (or are lost) by virtue of the graduate program.

Research Interactions: Grad students mentor undergraduates in vegetation descriptions, GPS and map reading, plant identification, and databasing of herbarium collections; microanatomical analysis of fungi resulting in undergrad co-authored publications; preparation and analysis of plant tissues for heavy metals and use of electron microscopy; and plant anatomical lab techniques and interpretation, resulting in an undergrad co-authored presentation at a national meeting. At least 50% of Dr. Shaughnessy's senior thesis students do projects connected with grad students. **Interactions in Classroom and Field Settings:** Graduate students often teach undergraduate Botany labs and field trips. In this context undergraduates ask graduate students questions about jobs in botany, how to do

research, and who to do it with. Most importantly, graduate students model the enthusiasm and dedication necessary to succeed academically and professionally as botanists.

6. Program uniqueness

If your program provides unique educational opportunities or course content that is found at few or no other CSU institutions, please describe this uniqueness.

Botany

HSU - The Best Undergraduate Botany Program in the Nation: For the reasons given below, "everybody who's somebody" knows that HSU is the place to go to study botany at the undergraduate level - this is reflected in the fact that we have the largest botany program in the nation among all universities. Of 44 Universities offering botany majors nationwide, HSU Botany is #1 with 91 majors; UC-Berkeley runs a distant 2nd at 67. **Field-Based Learning:** All Botany courses utilize the rich biodiversity and ecosystems of NW California, terrestrial and marine, to provide living materials and field environments for student learning. We are geographically poised as is no other CSU campus for access to varied environments from coastline to interior mountains, and capitalize on this situation (see **III.D.3**). **Arcata Community Forest as Outdoor Classroom:** The ACF provides perhaps the most unique opportunity in the CSU for "immediate" botanical field experience for students, due to the fact that it is intact and immediately adjacent to campus. Field trips during labs, as well as undergraduate student research, are conducted there. **On-Campus Botanical Diversity:** The HSU campus and Greenhouse provide learning resources that exist no where else in the world, and are utilized extensively in Botany courses. We have one of the most extensive conifer collections in the world planted on campus or in the Greenhouse. The 'outdoors collection', a result of 40 years of effort by Emeritus Professor Dennis K. Walker, is used as material for teaching introductory botany, plant morphology and anatomy, plant taxonomy, as well as Forestry Dept. dendrology. **Breadth of Faculty Expertise:** The HSU Botany Faculty maintain a broad range of expertise in botanical subdisciplines - plant ecology, plant anatomy and development, plant morphology and phylogeny, paleobotany, algal systematics and ecology, fungal systematics and ecology, forest pathology, phytogeography, plant physiology, phytoremediation, plant systematics, plant animal interactions, and tropical ecology. This is reflected in the range of HSU botanical course offerings, the most diverse in the CSU. Faculty expertise provides students with many options for undergraduate research. As testimony to this quality

and breadth of instruction, HSU Botany students are in demand across the country because of training, and are highly successful in landing jobs and internships.

Botany Minor

See section **II.1** for details.

7. Opportunities for undergraduate scholarship/creative activities/service
Estimate the percentage of your undergraduate majors that participate in scholarship/creative activities/professionally-related service, and provide some illustrative examples of such activities. Can students receive academic credit for these activities and have them counted toward undergraduate major requirements?

Senior Thesis/Directed Study: As described in "Capstone Experiences" above, all Botany majors must complete senior thesis/directed study projects (BIOL 490/499), for which they receive 1 or more units of academic credit required for graduation. Over the past three years senior thesis projects have led to four peer-reviewed publications in major scientific journals: undergraduates Ryan Meszaros, Heather Mehl, and others have co-authored papers with Botany faculty.

D. Affiliations/Equipment/Facilities/Environment

1. Affiliations

Some academic programs are affiliated with on-campus or off-campus centers, units or institutes that bring important benefits to programs. For any such center/unit/institute, please provide (1) the name of such center/unit/institute, and very brief descriptions of (2) the purpose of the center/unit/institute, (3) the nature of your program's affiliation with the center/unit/institute, and (4) the benefits accruing to your program/major from your affiliation with this center/unit/institute. Units/centers/institutes may be public (HSU, CSU, local, state, federal) or private.

California Ocean Observing System: Dr. Shaughnessy, elected - monitoring of coastal marine ecosystems from Point Conception to the CA-OR border; data used in multiple CNRS classes, student research, and state agencies, and mariculture companies. **Consortium of CA Herbaria:** Dr. Mesler & Ms. R. Bencie, invited; a CSU and UC effort to study and make web-available information about California plants; through MOU's local agencies as well as HSU students use the HSU Herbarium for research. **Deer Creek Field Station & Siskiyou Field Institute, OR:** Dr. Jules, a founding member; used for field-based courses and research projects on the ecology of the Pacific NW; multiple HSU classes go there for weekend field trips. **HSU/University of Guyana/Louisiana State University/Duke University Tropical Fungi Collaboration:** Dr. Henkel, Co-PI; purpose is to study the evolution and

ecology of tropical rainforest fungi in Guyana; HSU and University of Guyana students do field work at this long-term study site. **Humboldt Bay Ecosystem Based Management Board of Advisors**: Dr. Shaughnessy, invited; multi agency, NGO, and academic board charged with improving biological, and economic health in and around Humboldt Bay; collaborative research opportunities for graduate students. **NASA Astrobiology Institute**: multiple universities and Dr. Tomescu, invited; studying the potential for extraterrestrial life by examining Earth's organisms and climate; provides undergraduate research experiences. **Redwood National & State Parks**: Emeritus Prof. D. Largent & Dr. Henkel, PI; long-term monitoring of fungi in forest plots; used by students in mycology courses and graduate students for field trips and research. **Redwood Sciences Project**: Drs. White & Lu, founders; further training of K-12 science and math teachers and teacher recruitment; five counties from NW CA (see section VI). **Natural History Museums - Smithsonian, Field Museum (Chicago), Denver Natural History, University of Kansas**: all lend fossil research specimens to Dr. Tomescu in order to understand the evolution of early land plants; used by undergraduates for senior thesis projects.

2. Facilities and resources

Provide a brief listing of your most important facilities, equipment and information/library resources, and describe the degree to which the current facilities, equipment and information/library resources affect program quality.

Greenhouse and Campus Floristic Diversity: see III.C.6. **Experimental Greenhouse**: used by undergraduate and graduate students to set up plant experiments. **Plant Growth Chambers**: used by BOT 310 students and senior thesis projects. **Algal and Fungal Culture Lab**: provides living teaching specimens for over 600 students each year. **Plant Herbarium**: largest collection of N. California plant specimens; used by student, faculty, and agency research (see III.D.1). **Other Botanical Herbaria**: Collections (> 10,000 specimens) of fungi, seaweeds, lichens and bryophytes are used for HSU teaching and research, and by agency personnel. **Marine Laboratory in Trinidad**: used by phycology undergraduate and graduate students.

3. Unique local and regional environment

Describe how the program takes advantage of the unique local or regional social, cultural and/or natural environment available to students and faculty at HSU. (Do not include items listed under D1.)

Regional Ecosystem Diversity. Examples include mycology courses (BOT 358, 359, 360, 394) which conduct field trips and collect fungi from the Oregon border down to the King Range, and inland as far

as the Trinity Alps, accessing elevation zones ranging from sea level to 5000'. The mild, wet winter months provide opportunities for winter field mycology on the coast afforded by very few, if any, other campuses. Phycology courses (BOT 353, 553) make extensive use of the diverse near-shore marine environments within striking distance of HSU. Plant Ecology (BOT 330) makes extensive use of local community diversity by conducting labs at the Dunes, the Bay, and Arcata Community Forest. Plant Taxonomy courses utilize a wide swath of NW California for collecting materials and conducting field trips.

IV. Investments, Revenues, and Efficiencies (Response Limit: 2 pages of narrative, not including tables) [20%]

A. Program Investments

1. Program Investment – Degree Requirements

Enter the total number of required course units (as listed in the catalog) for this academic program, and then the number of required course units for this academic program that are from the primary course code associated with your program. Provide a total for each option if appropriate.

Student Units

Major	Total required SCUs	Required Program SCUs in the primary Course Code
Botany	66	24

Note: GE and other University-wide graduation requirements are not included in these calculations.

Weighted Teaching Units (WTU's)

Total the number of WTUs required to teach 1 section of each of the required courses in the program. If there are lists of restricted electives (e.g., take 1 of the following 3 courses), then choose a representative course from the list. For required S-factor courses, estimate the typical number of WTU's assigned to a faculty member who teaches the course. Again, differentiate by option if appropriate.

Major	Total required Program WTUs	Required Program WTUs in the primary Course Code
Botany	89	35

Note: because the WTU cost is for one teaching and matching lab section, AT for large lecture and TA coordination has not been included.

2. Program investment – by Minimum Weighted Teaching Units required to offer coursework so students can make reasonable progress toward their degree.

Complete the table below using the definitions that follow. Include additional columns as needed for additional options.

Total WTU in Course Code	WTU for GE and service to other academic Programs	WTU for Major Option 1	WTU for Major Option 2	WTU for Major Option 3
323	194	129	NA	NA

*Total WTU in Course Code: Sum up the total number of WTU that were used to teach courses in the primary course code associated with your academic program **over the past two academic years**. Exclude remedial courses.*

*Service to GE and other Academic Programs: Enter the total number of WTU that were used **over the past 2 years** to meet service demands imposed by students outside the major. (In other word, if 8 sections of Egyptology 301 have been offered over the past 2 years, but if 2 sections over the past 2 years would have been sufficient for the Egyptology majors, then count 6 sections of Egyptology, and the associated WTU, in this category.)*

*WTU for Major Option (s): Sum up the non-service WTU for the set of courses in the course code associated with your program that you would need to offer **over a two year period** to accommodate progress toward degree for your program students.*

Notes: 1) In programs with multiple options, courses common to the multiple options should be included in all options. Hence the entries to the right of the “Total” entry will not sum to the total. 2) Do not pro-rate WTU’s by the percentage of students in a particular section of a course that are majors. Include the course in the count if it must be offered during a 2-year period for students to make progress toward their degree. The 4-year major plan for freshmen may be useful.

3. Program Investments – by staff allocations.

Estimate the percent of departmental expenditures for staff positions that can be attributed to this academic program. Provide an explanation, as appropriate.

	Major Program
Percents of Staff FTEF	20%

Staff FTE

Description	CBID	1/31/2004		1/31/2005		1/31/2006		1/31/2007		1/31/2008	
		Count	Sum	Count	Sum	Count	Sum	Count	Sum	Count	Sum
BIOLOGICAL SCIENCES	R07	1	1.00	1	1.00			1	1.00	1	1.00
BIOLOGICAL SCIENCES	R09	10	7.00	11	7.40	10	7.18	11	7.50	13	8.47
Total		11	8.00	12	8.40	10	7.18	12	8.50	14	9.47

The Department of Biological Sciences estimates that 20% of staff FTEF is attributable to duties associated with the Botany major.

4. Program Investments – Other annual costs.

Provide dollar estimates for other program costs by the following categories. Annualize periodic costs (equipment purchases or facilities upgrades) as necessary. Include an explanation, if appropriate. Do not include costs for commonly used items (smart classrooms, faculty workstations, etc.).

Category	Estimated Cost
Equipment (including maintenance)	\$23,056
Instructional Supplies	\$7,013
Temporary Help (graders, lab assistants, GA's, etc.)	\$44,678

Note: figures are averages based on past three years for Botany.

5. Program Investments – accreditation [if applicable]

If this program is accredited, describe how this accreditation affects program costs.

N/A

B. Gross Revenues

Revenue DEPARTMENTS COMPLETE THIS SECTION	05/06	06/07	07/08
Fundraising/donations	\$4,405	\$4,186	\$5,102
Extended Education	\$1,772	\$1,329	\$1,071
Student fees	\$9,552	\$7,706	\$5,501
Instructionally Related Activities (IRA)	\$456	\$1,063	\$1,544
Instructionally-related grants	0	0	\$660
Grants and contracts to P.I.s	\$923,166	\$817,419	\$990,978
Other revenues	0	0	\$756

Note: values are specific to the Botany major within the Department of Biological Sciences.

Provide an explanation for how these revenues support the academic program.

People dedicated to the pursuit of botanical excellence at HSU provide at least a 33% augment of non-state dollars to the department's budget, and this number is actually higher because of some exceptional people. In particular, Emeritus Prof. Dennis K. Walker has created a Botany Trust that pays for a BOT 105 Lab Preparator (4K/yr), a Greenhouse Assistant (4K/yr), and a Dennis K. Walker Botany Award (1K/yr). The Rumble and Meredith Awards for Botany students provide \$200-\$300/yr, and the recent Jennings' Memorial Scholarship provides 1K/yr. Grant buyout by four Botany faculty generates money back to the department (10K-15K/yr), and these grants also directly support teaching

and scholarship. Student lab fees, which supplement departmental OE, have been declining and may be disallowed completely by the Chancellor's Office.

C. Efficiency

1. Efficiency – By SFR for course code

Academic Year Averages	Subject	02/03	03/04	04/05	05/06	06/07	07/08
SFR	BOT	14.59	16.05	15.14	15.81	16.20	17.28
FTEF	BOT	8.88	7.60	8.96	7.43	6.52	5.75

SFR SUMMARY	02/03	03/04	04/05	05/06	06/07	07/08
AHSS	20.36	22.05	21.94	20.61	21.19	22.91
CNRS	15.66	16.90	17.17	16.04	16.82	18.28
CPS	15.12	16.29	15.68	15.22	20.80	25.33
UNIVERSITY TOTALS	17.28	18.65	18.57	17.52	19.32	21.43

Explain any substantial changes in SFR. Also explain why this SFR differs from the college and/or university SFR. What efforts have been made over the past few years by the program to improve this measure of efficiency? Use the data under part IV.E. as appropriate.

The SFR target for the Botany major is 18.0 as set by the Dean of CNRS. SFR has increased since 06/07 because of: decrease in Botany faculty FTEF (see section II); offering of BOT 300; reduction in the number of BOT 310 lab sections; reduced offering of BOT 321 and 372; and more sections of BOT 105 being taught by Lecturers.

Our department has also initiated more stable changes to increase SFR. Only some of these changes improve the quality of our teaching mission. As of F08, BOT 105 has changed from two lectures + two labs (3 hours each) per week to a 3 + 1 format and three other courses in the department have cut labs or added lecture time.

2. Efficiency – Other views.

The Prioritization Task Force will examine the data given under section IV.A and B in terms of the overall production (e.g. number of majors, number of graduates) in the program. Please comment if appropriate.

The Botany major is extremely efficient in terms of both high WTU service contribution (i.e. 60% of all the WTU's required to offer the major) and gross revenues, most of which are not state dollars. In addition, the number of majors has climbed to 91 (F08; largest Botany major nationwide) and 16% - 28% of Botany majors graduate each year.

D. Budget cut impacts

Indicate how your program has been affected by recent (since 2002-2003) budget cuts that have directly affected resources for your program (faculty, staff, operating expense) and course offerings (class size, reduced course offerings or options for the major.) Refer to the data included under section IV. E. or in the departmental report as appropriate.

Budget cuts have had negative impacts on the Botany program: loss of hands-on learning time in BOT 105, decrease in the frequency of offering for BOT 310, 321, 372 (required for the major) and for electives that provide advanced botanical research opportunities for students. Faculty advisors are more often facing the choice of impeding progress toward a degree because courses are less available. Dr. Sillett has not been replaced, and we have had to go outside of the pool of qualified lecturers to hire one with marginal qualifications in order to respond to last minute enrollment increases.

Grant buyout for scholarship is instead being used to restructure courses to increase SFR, provide extra training for a marginally qualified hire, and to write this document. There is no money for travel to professional meetings or AT for innovative scholarship and curricular work. The CNRS capacity to provide matching funds when competing for extramural grants is extremely poor. OE are so low that the department may have faculty pay for their own laboratory phones and data lines. Botany faculty have been interviewing at other universities.

E. Additional Data

Course Offerings Profile in Botany (AY 00/01 - AY 07/08)								
class_offerings_BOT report generated: 27-JUN-08								
	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Distinct Courses Enrolled	12	12	13	10	11	10	10	6
Sections Enrolled	35	34	35	30	33	31	28	24

Average Section Enrollment	27	27	29	31	31	29	28	32
Distinct Courses Enrolled in Botany by Level (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	1	1	1	1	1	1	1	1
Upper-div	10	9	11	8	9	8	9	5
Graduate	1	2	1	1	1	1	1	0
Total	12	12	13	10	11	10	10	6
Sections Enrolled in Botany by Level (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	11	11	11	11	11	12	11	13
Upper-div	22	20	23	18	20	18	17	11
Graduate	2	3	1	1	2	1	1	0
Total	35	34	35	30	33	31	28	24
Avg Section Enrollment in Botany by Level (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	33	34	37	36	37	34	35	34
Upper-div	24	26	26	28	30	26	24	29
Graduate	11	8	9	14	11	10	11	
Total	68	68	72	78	78	70	70	63
FTES in Botany by Course Level (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	50.6	51.8	56.7	55.6	55.6	57.3	52.5	58.2
Upper-div	67.9	63.4	72.1	64.9	77.1	59.0	52.1	41.1
Graduate	2.6	3.1	.8	1.5	2.9	1.1	.9	.0
Total	121.2	118.3	129.6	122.0	135.6	117.4	105.6	99.3

Note: In the above tables all class sections have 2 or more students enrolled. This is done to minimize the influence of independent student sections. Distinct Courses count each distinct SUBJ/Course-number combination enrolled. All figures are Fall/Spring term averages. Due to the rounding of average Academic Year counts, the various breakouts may not add to the exact same amounts.

Other Class Offering Breakouts

These examine independent study sections, and sections by different modes of instruction. The Lecture-only sections have only a C1 through C6 mode. The Lab/Activity-only sections have only a C7 through C-16 mode. Other modes and combinations contain the remaining modes or combinations of lecture and lab/activity modes.

Other Special breakouts in Botany (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Sections with 1 student enrolled	0	1	1	1	1	1	0	0
Lecture only sections	12	12	12	10	11	10	10	7
Lab/Activity only sections	23	22	23	21	22	21	18	17
Other modes and combinations	0	0	1	0	0	0	1	0

Service Courses

The following shows sections which are considered service for either General Education, CWT (Communication and Ways of Thinking), DCG (Diversity and Common Ground), or Institutions Requirements.

Service Course Sections Enrolled in Botany (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	11	11	11	11	11	12	11	13
Upper-div	2	2	2	1	1	0	1	0

Service Course FTES in Botany (AY 00/01 - AY 07/08) class_offerings_BOT report generated: 27-JUN-08								
Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	50.6	51.8	56.7	55.6	55.6	57.3	52.5	58.2
Upper-div	9.0	9.3	6.5	7.8	12.4	.0	8.0	.0

V. Potential (Please complete this section for each option. Limit: 2 pages per option) [15%]

A. Program capacity with existing resources:

1. What is your program's maximum capacity with current resources? Use two metrics to define "capacity": The number of graduates per year, and the number of FTES generated by courses that are unique to this option, per year.

(Completed by the department)	Seats	FTES in the major option per year
Existing (seats filled at census)	3237	842.7
Maximum capacity with existing resources	3479	897.1

Note: Per our conversation with Dr. Oliver, we calculated 07/08 values of seat capacity (total sections, seats / section) for each course required for the major (BOT + other CNRS courses) versus actual census enrollment.

2. If your program is at maximum capacity, proceed to part B. If you have capacity to grow with existing resources, what steps have been taken to increase enrollment? What have been the effects of these steps, and what results are still anticipated?

Table values indicate some potential for increasing capacity, but finer scale examination of each 07/08 course shows that all upper division BOT courses were at or close to capacity. We can't definitively say which of the courses required for our major are truly impacted even when they are at capacity, because we know that some courses have historically been able to add more sections. Courses significantly below capacity included BIOL 105, PHYX 118, ZOO 110/210, whereas several other lower division courses like BOT 105 were moderately below capacity. Instructors for most lower division classes, including BOT 105, over-enroll each section but students still drop the course too near the census date for new students to be added. This reality still applies even though the new F08 curricular structure of ZOO 110 and BOT 105 (see IV.C.1) theoretically raises capacity. More teaching power and sections of upper division BOT courses (and others like CHEM 109, BIOM 109, BIOL 340) would have to be added in order for the Botany major to grow significantly.

B. Opportunities for future growth or substantial curricular changes

1. What opportunity does the program have for future expansion? Provide evidence for your response.

We are certain our Botany Program can continue to increase the number of students, primarily by advertising the fact that our program is the largest and broadest in the nation. Currently, our advertising program is minimal, and has been a subject of ongoing discussion among the botany faculty over the last two years. Because professional botanists know about the exceptional nature of our program, our graduates are often sought out for positions in public agencies, non-profits, and private consulting firms. However, prospective students generally do not know about our reputation. We are convinced that a more robust website will have significant impacts on our program. For instance, our existing website does not advertise that we are the largest program in the country, and does not describe most of our program qualities. In addition, we are planning to make our program more attractive by responding to the national and international demand as emphasized by science panels (see **II**, External demand), to make our Botany curriculum on the environment and evolution even stronger.

2. Describe the curricular changes and/or staffing increases required to accomplish such an expansion?

See C below.

C. Impact of augmented resources

Suppose that your program were ranked in a category that recommended augmentation of resources. What would be the impact of augmented resources? (Answer for a 10% augmentation and a 20% augmentation.)

Our approach in discussing how the Botany program could grow must be presented in the context of how the entire department would expand. Curricula, faculty mentoring, and finances are all mixed across the programs in our department, which is a synergism that benefits our students.

10% augmentation (~ \$300,000):

The entire department agrees with the need to hire a person who uses molecular approaches to study evolution. The Botany program also supports increasing equipment for the Biotechnology Core Facility. Taken together, these two steps improve capacity across the entire department to teach the use of molecular approaches to answer ecological and evolutionary questions. A final hire for the Botany program at this level of augmentation would be either a terrestrial non-vascular plant botanist or grass specialist to replace Dr. Sillett. Government agencies are routinely mandated to do surveys for these kinds of organisms and our program has gone from being the preeminent location on the west coast of

North America for this training, to being a location where none of this training is occurring. CNRS has agreed to promote this position request so long as our department meets an SFR target of 18 and there are 100 students in the Botany major.

20% augmentation (~ \$600,000):

The department also agrees for the need to hire a marine systems biologist. This type of person will bring strong quantitative skills to benefit all programs in the department, as well as expertise in marine systems that will help the department's Marine Biology option grow into a major. Finally, this level of funding should also support teaching post-doctoral fellowships to deepen the pool of quality Temporary faculty.

D. Impact of reduced resources

Suppose that your program were ranked in a category that recommended reduction of resources. What would be the impact of reduced resources? (Answer for a 10% reduction and a 20% reduction.)

The Botany program would lose its preeminent status in the country. Further cuts would negatively impact time to degree, program capacity, and quality. We have already decreased lab time for our core curriculum in half. Cuts nearing 20% would decrease faculty expertise, undergraduate and graduate advising, research sponsorship, committee contributions, and shared governance. Faculty will leave.

E. Impact of program elimination

Suppose that your program were recommended to be discontinued. What would be the impact of program elimination?

Internally, there would be a large loss of GE science, seven options in the Biology major including Marine Biology and Cell Biology would lose required BOT courses, and seven other HSU majors would lose required BOT courses. Externally, we would not be supplying the botanical literacy and scientific expertise needed to address the environmental challenges of today.

VI. Additional Information (Limit: 1 page) [up to 5 extra credit points may be assigned to the overall score]

Provide crucial information that is not provided under the previous categories.

The Redwood Science Project (RSP) has several botanical initiatives externally funded and supporting students, teachers, and faculty. We developed and are disseminating the “Grocery Store Botany” curriculum for public schools and general audiences to promote scientific understanding about plants relevant to healthy nutritional choices. Round Valley schools and the RV Indian Health Center are partners. The RSP team presents the curriculum at the CA Science Teacher Association Conference this month. We also host teacher institutes and workshops on a) Plant identification for the CA Northcoast flora including assistance from the HSU Herbarium, b) California vegetation and wildland fire ecology, and c) Forest ecology in northern CA. Lastly, we host the Natural History Education Leadership Institutes one focusing on Redwood Forest Ecology, and another on forest systems on Lassen Volcanic National Park. We will offer additional workshops and institutes on these topics in 2009. Furthermore, we are in the pre-production phase of short films and podcasts associated with this work as part of the California Environmental Legacy Project, a statewide efforts co-founded by botanist Dr. Jeffrey White and sponsored by the RSP.

APPENDIX

HSU *Vision* Statement

1. Humboldt State University will be the campus of choice for individuals who seek above all else to improve the human condition and our environment.
2. We will be the premier center for the interdisciplinary study of the environment and its natural resources.
3. We will be a regional center for the arts.
4. We will be renowned for social and environmental responsibility and action.
5. We believe the key to our common future will be the individual citizen who acts in good conscience and engages in informed action.
6. We will commit to increasing our diversity of people and perspectives.
7. We will be exemplary partners with our communities, including tribal nations.
8. We will be stewards of learning to make a positive difference.