

## **HSU Academic Program Criteria**

### **Academic Program in Computer Science**

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#### **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.

#### **Introduction: Computer Science Defined**

Computer Science, also called informatics in Europe, is the study of computers and computational systems: their theory, design, development, and application. Principal areas within Computer Science include artificial intelligence, computer systems, networks, numerical analysis, programming languages, software engineering, theory of computing, and design and analysis of data structures and algorithms. Thus, students pursuing a Computer Science degree explore the theory and application of computer science. The program provides a thorough understanding of math and a basic understanding of physics, preparing students for active roles across the breadth of computer science.

#### **Feature #1: The Science of Design**

*Humboldt State University will be the campus of choice for individuals who seek above all else to improve the human condition and our environment.*

The above introductory statement includes a key area, software engineering, that brings the goal of improving the human condition – and consequently the environment – to the center of student application of principles in computer science. All majors participate in a capstone course on software engineering, and they also have multiple opportunities for additional applications of the design in courses such as robotics and robotic embedded systems. One might say that the whole of the major is about finding ways to improve the human condition through appropriate applications of technology to help people manage their daily lives in an increasingly complex and interconnected world.

## **Feature #2: Computer Literacy for Scientists**

*We will be stewards of learning to make a positive difference.*

Computer science has become essential for development of science and social science programs in universities, much as mathematics was during the 20<sup>th</sup> century and continues to be today. Prominent growth fields at Humboldt State University, such as biology, molecular biology, journalism, analytic economics, geographic information systems, environmental science oceanography, hydrology, geology, marine biology, and others are increasingly dependent on computational models and methods for successful research and pedagogy.

## **Feature 3: Expanding Diversity**

*We will commit to increasing our diversity of people and perspectives.*

The Computing Science Faculty, led by Professor Amoussou, were partners in creating the Scientific Leadership Scholars Program that is helping to diversify the computer science major. There are currently 5 new majors as a result of this program. In addition, the faculty, led by Professor Dixon, continue to work with international partners in Germany and France to bring a diversity of perspectives through student and faculty exchange programs.

**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

1. Headcount Data

<b>Major Academic Year (Fall/Spring) Average Headcount Summary</b>									
Majors_overview_CSCI 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
CSCI	Computer Science	0	4	20	28	42	43	48	48
<b>Total</b>		<b>0</b>	<b>4</b>	<b>20</b>	<b>28</b>	<b>42</b>	<b>43</b>	<b>48</b>	<b>48</b>

<b>Second Majors by Academic Year (exclusive of primary majors)</b>									
Majors_overview_CSCI 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
CSCI	Computer Science	0	0	2	1	4	3	2	3
<b>Total</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>

<b>Majors by Sex and Ethnicity</b>									
Majors_overview_CSCI 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	0	0	1	1	0	0	1
	Black	0	0	0	0	0	1	1	1
	White	0	1	1	2	2	3	2	3
	Other	0	0	0	0	0	1	1	3
	Unknown	0	0	2	0	2	2	5	3
<b>sum</b>		<b>0</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>7</b>	<b>8</b>	<b>10</b>
Male	Asian	0	0	1	1	4	4	5	4
	Black	0	0	2	3	0	2	2	0
	Hispanic	0	0	1	1	2	4	5	3
	Native Amer	0	0	0	0	0	0	1	2
	White	0	3	12	16	20	20	20	20
	Other	0	0	0	1	3	1	2	3
	Unknown	0	1	2	5	9	7	7	7
<b>sum</b>		<b>0</b>	<b>4</b>	<b>18</b>	<b>26</b>	<b>37</b>	<b>36</b>	<b>41</b>	<b>38</b>

<b>Computer Science (with options) Degrees Awarded (incl. primary and second majors)</b> degrees_awarded_B_CSCI report generated: 25-JUN-08								
<b>MAJOR</b>	<b>AY 99/00</b>	<b>AY 00/01</b>	<b>AY 01/02</b>	<b>AY 02/03</b>	<b>AY 03/04</b>	<b>AY 04/05</b>	<b>AY 05/06</b>	<b>AY 06/07</b>
Computer Science	0	0	0	0	0	5	5	2
<b>sum</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>2</b>

<b>Computer Science Degrees Awarded by Sex and Ethnicity (incl. primary and second majors)</b> degrees_awarded_B_CSCI report generated: 25-JUN-08									
<b>SEX</b>	<b>Ethnicity</b>	<b>AY 99/00</b>	<b>AY 00/01</b>	<b>AY 01/02</b>	<b>AY 02/03</b>	<b>AY 03/04</b>	<b>AY 04/05</b>	<b>AY 05/06</b>	<b>AY 06/07</b>
Female	White	0	0	0	0	0	0	0	1
<b>sum</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
Male	Asian	0	0	0	0	0	1	0	0
	White	0	0	0	0	0	4	2	1
	Unknown	0	0	0	0	0	0	3	0
<b>sum</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>1</b>

2. FTES by Course Code

<b>FTES taken in Computer Science classes by Majors (AY 02/03 - AY 07/08)</b> course_ftes_smry_CS report generated: 30-JUN-08									
<b>SUBJ</b>	<b>Course level</b>	<b>Student Major</b>	<b>AY 02/03</b>	<b>AY 03/04</b>	<b>AY 04/05</b>	<b>AY 05/06</b>	<b>AY 06/07</b>	<b>AY 07/08</b>	
CS	Lower-div	Computer Science	1.4	2.4	4.9	5.3	5.0	4.3	
		Mathematics	2.3	.4	1.3	3.9	2.7	2.1	
		Undeclared	.2	.4	.5	.0	.3	.4	
		Biology	.1	.0	.0	.0	.1	.3	
		Political Science	.0	.0	.0	.0	.2	.2	
	<b>Sub-total</b>		<b>6.4</b>	<b>4.6</b>	<b>7.8</b>	<b>11.7</b>	<b>10.0</b>	<b>8.4</b>	

FTES taken in Computer Science classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_CS 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	Computer Science	.5	1.5	.8	2.3	3.4	2.7
		Political Science	.0	.0	.0	.0	.1	.3
		Computer Information Systems	.0	.1	.3	.2	.3	.2
		Physics	.0	.0	.0	.1	.0	.0
		Undeclared	.0	.1	.0	.1	.1	.0
	<b>Sub-total</b>		<b>.6</b>	<b>1.8</b>	<b>1.3</b>	<b>3.2</b>	<b>4.1</b>	<b>3.2</b>

FTES taken in Computer Science classes by Majors (AY 02/03 - AY 07/08)								
course_ftes_smry_CS 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
CS	All Levels	Computer Science	1.9	3.9	5.7	7.6	8.4	7.0
		Mathematics	2.3	.5	1.4	4.4	2.9	2.1
		Political Science	.0	.0	.0	.0	.3	.5
		Undeclared	.2	.5	.5	.1	.4	.4
		Computer Information Systems	1.1	1.3	.8	1.1	1.0	.3
<b>Total</b>			<b>7.0</b>	<b>6.4</b>	<b>9.1</b>	<b>14.9</b>	<b>14.1</b>	<b>11.6</b>

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
Mathematics		CS 131 (4)

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.

The Computer Science degree was instituted in the fall of 2001 and had its first graduate after the spring of 2005. Unfortunately there was some “bad timing” at the start of the program, since the “dot-com” bust of the late 1990’s and early 2000’s had a dramatic effect on the interest in such programs. According to the Computing Research Association, “the percentage of incoming undergraduates indicating that they would major in CS declined by over 60 percent between the Fall of 2000 and 2004, and is now 70 percent lower than its peak in the early 1980s.

“ [<http://www.cra.org/CRN/articles/may05/vegso>] Thus, growth in the computer science program has been modest, averaging about 7 new majors per year since it’s inception.

There are some signs that the interest in computer science programs has rebounded of late. For example, Sacramento State University is up 20% in computer science enrollments for the fall 2008 over the prior year, though they are an exception within the CSU. We expect that computer science will once again become an extremely attractive discipline. However, as noted in the Noel-Levitz Program Demand Assessment, taking full advantage of the increased student interest in computer science is contingent upon marketing which explains how our computer science program provides unique opportunities and marketable advantages upon graduation.

#### 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.

From the US Department of Labor’s 2008-2009 Occupational Outlook (DLOO), “Employment in professional, scientific, and technical services will grow by 28.8 percent and add 2.1 million new jobs by 2016. Employment in computer systems design and related services will grow by 38.3 percent and add nearly one-fourth of all new jobs in professional, scientific, and technical services. Employment growth will be driven by the increasing reliance of businesses on information technology and the continuing importance of maintaining system and network security....Demand for these services will be spurred by the increased use of new technology and computer software and the growing complexity of business.”

Again, from the DLOO, “Employers who use computers for scientific or engineering applications usually prefer college graduates who have a degree in computer or information science, mathematics, engineering, or the physical sciences. ...Most systems programmers hold a four-year degree in computer science. Extensive knowledge of a variety of operating systems is essential for such workers. This includes being able to configure an operating system to work with different types of hardware and being able to adapt the operating system to best meet the

needs of a particular organization. Systems programmers also must be able to work with database systems, such as DB2, Oracle, or Sybase.”

Market forces will drive salaries higher, which in turn will generate greater demand for the degree. If Humboldt State positions itself properly through attractive innovations, there is no reason why we cannot see substantive growth in our computer science program majors.

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

A. Students

1. For undergraduate programs

<b>Computer Science (with options) Mean GWPE Scores (incl. primary and second majors)</b> degrees_awarded_B_CSCI report generated: 25-JUN-08								
<b>MAJOR</b>	<b>AY 99/00</b>	<b>AY 00/01</b>	<b>AY 01/02</b>	<b>AY 02/03</b>	<b>AY 03/04</b>	<b>AY 04/05</b>	<b>AY 05/06</b>	<b>AY 06/07</b>
Computer Science						17.2	16.0	16.5
Overall						17.2	16.0	16.5

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).

All graduating seniors take a “professional readiness” exam during their spring capstone course. This exam allows us to compare the quality of the student produced by our program with those students of other program. Approximately 2,500 student participate in the examination. The exam is called the **Educational Testing Service (ETS) Major Field Test in Computer Science**. The field test has been administered in each of the last 3 spring semesters to all graduating seniors. (2006, 2007, and 2008).

The results of this test show that overall our CS graduates compare favorably to students nationwide.

Further analysis gives the following comparative information:

**Mean Percentage Correct for ETS Assessment Indicators, 2006-2008**  
**Cohort Mean Percent Correct | ETS Comparison**

<b>Assessment Indicator</b>	<b>2006 Mean PC</b>	<b>All ETS Percent At or Below</b>	<b>2007 Mean PC</b>	<b>All ETS Percent At or Below</b>	<b>2008 Mean PC</b>	<b>Estimated* All ETS Percent At or Below</b>
Programming Discrete Structures and Algorithms	74	95	62	60	71	90
Systems	50	90	34	50	40	70
	56	85	37	25	55	85

In other words, the CS graduates from HSU are particularly strong in “programming” and in “systems,” since the mean score for our students exceeds the median score for all students nationwide by a significant margin. (e.g., In programming, our average student was in the 95<sup>th</sup> percentile in 2006, the 71<sup>st</sup> percentile in 2007, and the 90 percentile in 2008.) (There was a particularly troublesome year for our cohort of students in 2007, and we are not sure about why.)

## 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.

The faculty has managed a very balanced approach to carry out their commitment to the continuous improvement of teaching and of the curriculum. Their activity includes professional development in campus efforts on diversity and accessibility, and discipline-specific workshops and symposia to improve teaching, learning, and retention in the discipline. These latter efforts have a significant technical component to them in computer science, since improving student learning often involves faculty use of new applications, programming languages, and security schemes and protocols – to name a few.

Here are some of examples of recent faculty engagement in this area of continuous improvement of teaching:

Tuttle, Burgess, Dixon: Each faculty is a regular and active participant in regional and national organizations which focus on effective teaching in computing. In particular, these faculty are active in the Consortium for Computing Sciences in Colleges - Northwest (CCSC-NW) Conference and the Association for Computing Machinery (ACM) Special Interest Group in Computer Science Education (SIGCSE) technical symposium.

Tuttle, Burgess: These faculty regularly attend campus professional development opportunities in accessibility, learning outcomes, writing across the curriculum, and WASC theme 2 (Inclusive Academic Excellence).

Tuttle, Dixon, Burroughs, Amoussou: Over the past 2 years these faculty have all attended workshops in a specific technical area for improving instruction. Tuttle attended a

workshop on TeachScheme/ReachJava, Dixon attended a workshop on Python, Burroughs attended workshops on computer security, and Amoussou organized a workshop on the curriculum and pedagogy of the science of design.

Amoussou: Over the past 3-5 years professor Amoussou participated in several national and international symposia on recruitment, retention, and effective curriculum and pedagogy for underrepresented groups in computing fields.

Campbell: Professor Campbell has participated in 12 significant distance-learning educator trainings since 2005. This work has supported his creation of web-based resources for his courses and for the department.

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.

The program faculty include Amoussou, Burgess, Burroughs, Campbell, Dixon, and Tuttle.

Scholarship/Creative Activities/Service	05/06	06/07	07/08
At least one peer-reviewed publication or creative product	67	33	50
At least one funded grant or contract related to scholarship	17	17	33
Invited participant or leader of workshops, expert panels, or task forces	50	50	83
At least one presentation (paper, poster, exhibition, etc.) given at a professional society meeting	50	17	17
Professional service activities at a regional or national level	83	67	50
Service on at least one university or college-level committee (at least 1 hour/wk avg.)	67	67	67

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.

A main area of inquiry for the faculty in the program is the scholarship of teaching and learning and of currency in the curriculum. The pace of technological advances in computing

continues at a high rate. To stay current, faculty learn new applications, languages, and protocols so that the programs stay relevant for students.

A second area of inquiry is diversity in the fields of CIS and CS. Two projects which have current funding (Amoussou) are *Broadening Participation in Computing Demonstration Project: Coalition for American Indians in Computing (CAIC)*, and *Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) - Scientific Leadership Scholars Program (SLSP)*.

A third area of inquiry is in the pedagogy of the Science of Design. One project – already in its second generation – is *Research Experience for Undergraduates: Role Modeling in Sciences – Science of Design*, directed by Professor Amoussou.

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.

All faculty advise in the program. Amoussou is a faculty mentor for the international program and for the SLS program. Dixon is a mentor for the exchange students from Germany and France. There has been a computer science club with several years of activity. The current club sponsor is Tuttle. Students are also recruited for and encouraged to participate in the annual programming context. Dixon is the faculty advisor for this group.

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

Half of the computing science faculty are representatives from groups (women and minorities) who have not been traditionally well represented in departments of computing science.

### 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.*

Programming is a form of written communication that is unique to this field. There are at least 5 programming courses that students take in their degree program. All students also take a “capstone” course (software engineering) in which a large collaborative project is a central part

of the course. Students engage in written and spoken presentation of their ideas, and are evaluated on their ability to communicate in both forms.

2. Assessment

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

*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.*

The main assessment for computer science majors has been through the ETS subject area exams that are given to all graduating seniors. The results have affirmed the validity of our curriculum, as our mean score is significantly higher than the national average.

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.*

The program is not accredited.

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.*

Relevance and innovation is so centrally important to offering a modern computer science program, that we have already discussed this in section 1 of this report. The built-in flexibility allows for currency in the field and for innovation to meet campus needs and interests. Key special topics courses of late have been network security, Python programming, robotics, and the soon-to-be-piloted embedded systems course. The latter two courses are supported by a collaborative effort by Burgess, Owens (Mathematics), and faculty from industrial technology to pilot courses that may lead to an option in “Robotic Embedded Systems” – a combination of robotics and embedded computational and control systems.

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.*

Not applicable.

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.*

Other than the twice-noted flexibility that is built in to the structure of the academic program, the computer science degree is a solid basic degree, not substantially different from what students could get at our sister campuses in the CSU.

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?*

The main student opportunities for undergraduate scholarship and creative activities come through the Software Engineering capstone course. Students engage in a full collaborative project which simulates the work of a professional in the field, and which requires students to prepare written and oral presentations of their work. Students who show particular early interest in design are also encouraged to apply for a summer research scholarship in the Science of Design REU (Research Experiences for Undergraduates). Over the past 3 years, a total of 8 computer science students have participated in this project, many of whom have produced papers that were delivered at a national meeting. Such students can receive academic credit that counts toward their degree.

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.*

The program has been most strongly affiliated to HSU's now-defunct Courseware Development Center (CDC). Motivated by faculty in the Computing Science Department, the CDC became a

main source of student internships and employment for both CS and CIS majors. A second important affiliation is with the various IT entities on campus, including telecommunications and academic computing. Several employees in these areas have either graduated from the department programs or have been instructors in the department when enrollments were higher.

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.*

The critical facilities for the computer science department are the new dual-boot computer lab facility shared with the math department, and the recently renewed Internet Technology Lab which contains over \$100,000 of donated equipment from the SYSCO Corporation. Both of these facilities are necessary to the vitality and quality of the program.

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.)*

The HSU Computing Science Department, through the leadership of Professor Amoussou, was awarded a Broadening Participation in Computing grant called the Coalition for American Indians in Computing. National Science Foundation agreed that the HSU computing science department is unusually well-placed in reaching Native American students to consider a future in computing. This partnership with the tribes in our region is intended to provide high school and college age students with early opportunities in programming and applied computing.

**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

Total required Program SCUs	73	Required Program SCUs in the primary Course Code	28*
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\*The number of units could also be listed as 40 since some CIS courses are technically also CS courses.

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.*

Total Required Program WTUs	78.1	Required Program WTUs in the primary Course Code	28.6*
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2. Program Investments – by staff allocations.

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

	Major Program
Staff FTE	7.5%

The computing science office was combined with the Math Department office. The current level of appointment is 2 FTE. The computing science portion of the staff is ¾ of one position. The traditional level of support was 1 full position.

3. 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.

Total WTU in Course Code	WTU for GE and service to other academic Programs	WTU for Computing Science
60.4	2.6	57.8

*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.

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)	\$3500
	\$5880

Instructional Supplies	
Temporary Help (graders, lab assistants, GA's, etc.)	\$2200

5. Program Investments – accreditation [if applicable]

*If this program is accredited, describe how this accreditation effects program costs.*

Not applicable.

B. Gross Revenues

Revenue	05/06	06/07	07/08
DEPARTMENTS COMPLETE THIS SECTION			
Fundraising/donations	75	1250	1100
Extended Education	877	996	915
Student fees	5880	5580	5300
Instructionally Related Activities (IRA)	0	0	0
Instructionally-related grants	176558	369319	496932
Grants and contracts to P.I.s	13156	0	0
Other revenues	0	0	0

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

This table is identical to the one entered for the Computer Science program, reflecting the department as a whole. The majority of the funds in this table go to supporting the work of Professor Amoussou on expanding opportunities for minority students in computing sciences programs. A smaller amount – approximately \$7,500 over the past 3 years from revenue that comes in through donations, grant overhead, and CNRS student lab fees – go to support instruction through copying costs, printing costs, software license renewals, and short-lived equipment such as supplies for a robotics course laboratory.

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	CSCI	7.13	4.81	8.59	9.20	10.29	8.60
FTEF	CSCI	0.98	1.32	1.07	1.63	1.37	1.35

<b>SFR SUMMARY</b>	02/03	03/04	04/05	05/06	06/07	07/08
<b>AHSS</b>	20.36	22.05	21.94	20.61	21.19	22.91
<b>CNRS</b>	15.66	16.90	17.17	16.04	16.82	18.28
<b>CPS</b>	15.12	16.29	15.68	15.22	20.80	25.33
<b>UNIVERSITY TOTALS</b>	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.*

This is a program that is still growing. The efficiency of the program as measured by SFR will be low until the number of majors in the program doubles from its current level.

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 cost per graduate will remain high for at least another 5 years as the program grows. There may be ways to achieve greater efficiency by combining some lower division requirements with the CIS program until the time that enrollments can easily support both options.

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.*

Note that the data that is recorded in the tables below for academic years prior to the 2002-2003 academic year reflect the computer science courses that were formerly offered in conjunction with the now defunct mathematics department option in computer science.

E. Additional Data

<b>Course Offerings Profile in Computer Science (AY 00/01 - AY 07/08)</b> class_offerings_CS 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	1	2	3	5	4	5	5	5
Sections Enrolled	1	2	4	7	6	7	7	7
Average Section Enrollment	18	12	9	6	11	14	14	11
<b>Distinct Courses Enrolled in Computer Science by Level (AY 00/01 - AY 07/08)</b> class_offerings_CS 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	2	2	3	3	3	3	3
Upper-div	0	0	1	2	1	2	2	2
<b>Total</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>5</b>
<b>Sections Enrolled in Computer Science by Level (AY 00/01 - AY 07/08)</b> class_offerings_CS 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	2	4	4	5	5	5	5
Upper-div	0	0	1	3	1	2	2	2
<b>Total</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>7</b>
<b>Avg Section Enrollment in Computer Science by Level (AY 00/01 - AY 07/08)</b> class_offerings_CS 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	18	12	10	8	12	16	15	13
Upper-div			5	4	7	8	10	8
<b>Total</b>	<b>18</b>	<b>12</b>	<b>15</b>	<b>12</b>	<b>19</b>	<b>24</b>	<b>26</b>	<b>21</b>
<b>FTES in Computer Science by Course Level (AY 00/01 - AY 07/08)</b> class_offerings_CS 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	5.1	5.9	6.4	4.6	7.8	11.7	10.0	8.4
Upper-div	.0	.0	.6	1.8	1.3	3.2	4.1	3.2
<b>Total</b>	<b>5.1</b>	<b>5.9</b>	<b>7.0</b>	<b>6.4</b>	<b>9.1</b>	<b>14.9</b>	<b>14.1</b>	<b>11.6</b>

**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 Computer Science (AY 00/01 - AY 07/08)								
class_offerings_CS 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								
Lecture only sections	0	1	1	4	4	5	5	5
Lab/Activity only sections	0	1	1	2	2	2	2	2
Other modes and combinations	1	1	2	1	0	1	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)	Graduates per year	FTES in the major option per year
Existing	5	11.6
Maximum capacity with existing resources	24	50

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?

During 2000-2005, the department focused primarily on regional recruitment.

Recruitment was done by making numerous visits to regional high schools, representation at College of the Redwoods recruiting events, creation and distribution of marketing materials, website redevelopment, and similar activities. Face-to-face recruitment at high schools and CR were particularly ineffective, but it is likely that the website redevelopment has some positive

effect on the profile of the programs. International programs have added students to our classrooms, and the minority recruitment SLS program (Scientific Leadership Scholars Program) has contributed to our modest but steady growth (5 new majors as a result of the SLS program).

More efforts are needed.

B. Opportunities for future growth or substantial curricular changes

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

The department is in the preliminary phases of proposing a new degree track in computer science for environmental robotics. The environmental robotics track would provide students hands-on robotics software development opportunities and challenges. Robotics programs introduced in computer science programs at institutions both large (eg: Georgia Tech) and small (eg: Bryn Mawr, Presbyterian College) have reinvigorated computer science classrooms. They provide pedagogical opportunities that are less abstract and sterile than some traditional computer science instruction. Initiatives sponsored by the Institute for Personal Robotics in Education have increased enrollments at participating universities and improved passing rates in introductory courses and program retention. We believe we can derive similar benefits from this program since two of the three proposed courses could become regularly offered electives in the computer science program.

The department is also actively participating in the development of an interdisciplinary bioinformatics certificate program with the department of biology. While the US Bureau of Labor Statistics projections show biological scientists as a group growing a pedestrian nine percent during the 2006-2016 decade, high growth is expected and needed in California to supply a rapidly growing biotechnology industry. We anticipate that the bioinformatics certificate will become quite popular, and have considered crafting a more appropriate version better attuned to the background of a computer science major. We expect that the current bioinformatics certificate being developed will improve overall FTES through increased enrollments in lower-division courses.

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

The environmental robotics program option requires the creation of 3 courses, two of which would be offered per year. The program could be supported with current staffing as long as faculty from outside of the department (e.g., Mathematics or Engineering). The bioinformatics certificate program might also require additional courses – likely 1, but at most 2, in computer science. Again, existing staffing would be sufficient with the participation of Math and Biology faculty. If both opportunities were pursued, an additional faculty member would be required.

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.)*

A 10% funding augmentation would first be used to create and implement an aggressive and comprehensive recruitment campaign to boost program enrollments to a sustainable level. A second priority would be to increase the server capacity of the program to allow greater flexibility in current and future coursework, and to complement the Internet Technology Laboratory for student project work.

A 20% funding augmentation would, in addition to those priorities listed above, be used to establish the Environmental Robotics option in the major.

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.)*

A 10% reduction only in the CS program would require that we eliminate 1 course. require that we replace CS 234 with CIS 350. Students would have fewer opportunities to master multiple programming languages, and less coherence in their lower division coursework.

A 20% reduction would be difficult to realize in a program that already draws heavily from coursework in the CIS program. Thus, it might be best to consider reductions in offerings across the department. A likely target is to permanently discontinue CIS 310, database management for non-majors, and provide limited opportunities for students to take CIS 309, computers and social change. The effect would be to provide students in related majors with fewer choices related to computing literacy.

E. Impact of program elimination

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

Computer science has become essential for development of science and social science programs in universities, much as mathematics was during the 20<sup>th</sup> century and continues to be today. Prominent growth fields at Humboldt State University such as biology, molecular biology, journalism, analytic economics, geographic information systems, environmental science, oceanography, hydrology, geology, marine biology and others are increasingly dependent on computational models and methods for successful research and pedagogy. Most universities recognize that healthy programs in mathematics and computer science provide an intellectual foundation and wide array of resources in support of such programs. Simply put, computer literacy is not optional to a college education in the 21<sup>st</sup> century.

Computer science represents the greatest program growth opportunity at Humboldt State University, as noted under B1. In the long run, HSU is unlikely to reach its enrollment targets without realizing the significant growth potential from computer science.