

**Instructional Program/ Discipline Review
Report Guidelines, 2005-06**

[REVIEW](#)

COVER PAGE

Program/Discipline: Computer Science

TOPS Code: _____

Preparer: David Topham, Jon Degallier
Type/Print

Preparer: _____
Signature *Date*

Review & Dissemination Team: Hudson Asiema, David Bradford, Arleen Ong,
Type/Print

Review & Dissemination Team: _____
Signature *Date*

Comments:

Division Dean: Ron Quinta
Type/Print

Division Dean: _____
Signature *Date*

Comments:

Vice President: Jim Wright
Type/Print

Vice President: _____
Signature *Date*

Comments:

Received in VP of Instruction Office: _____
Executive Assistant *Date*

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1. Program Description and Scope

The Computer Science (CS) program prepares students for employment in careers in Information Technology such as computer programming and for transfer to 4-year schools in order to pursue an advanced degree.

- *Provide a brief narrative that describes the instructional program.*

We recognize that we serve two types of students: those who intend on getting an advanced degree (i.e. transfer) and those who are interested in enhancing employment skills, whether unemployed or on the job already. Fortunately there is no conflict in these two areas since the techniques needed are similar. The main difference is that transfer students need to focus on theory and the skills students on current tools and technologies. We teach the theory using current tools and technologies.

- *Describe how the program specifically serves students, faculty, staff, and/or the community.*

Because of our proximity to Silicon Valley, we are an important resource for skill-enhancement and transfer education. Staff and faculty all work together to support the needs of the students. We meet with faculty in local 4-year schools to discuss mutual areas of interest such as articulation agreements (IMPAC). The Advisory board consists of many community members that show great interest in our program and offer us valuable advice about how to improve the skills in our students. This is taken into consideration as we fine-tune our courses and create new courses.

Note that many students in our classes are working professionals bringing real-life problems to class to be discussed with instructor and with other students.

- *Describe how the program addresses current needs and applies current technologies.*

In the computer program, "current" is a key driving force. Although we keep the core concepts as our primary focus, we also must continually keep abreast of changes in programming languages, and software tools. The CS faculty takes this very seriously and make sure that our students are aware of the changing nature of their chosen field. We subscribe to academic alliances with major companies such as Sun, IBM, and Microsoft to ensure access to the latest software development environment/tools and free online training (e.g. the Sun Academic Initiative).

- *Discuss the impact of the program on the college and the impact the college and/or other college programs have on the program being reviewed.*

We recognize that we have an opportunity to reach out to other disciplines in the college to demonstrate the relevance of CS and to find ways to collaborate. Some recent successful efforts include assisting in the testing and data acquisition for Curricunet, the addition of courses to apply programming to specific content areas such as biotech, and discussions of how to emphasize the mathematical connections in the newly created robotics program. We believe we should improve in this area as much as possible to help increase enrollments.

- *Discuss the impact of the program on the community and the impact of the community on the program.*

We believe that the community has lots to offer us in improving our program and hope to find ways to increase that contact in addition to the yearly advisory committee meeting. An

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idea has been suggested to look for ways to volunteer programming solutions to local non-profit or small business to give students on-the-job experiences as part of a capstone project experience. We hold annual faculty meetings with ROP to provide the opportunity to exchange course outlines, discuss the programs, and improve the curriculum. Last year we began an outreach program to teach Java in local high schools. This is another area that will benefit enrollments and therefore needs more focus.

2. Relationship to Ohlone College Mission and Goals

- *State how the program supports one or more of the Ohlone College goals.*

We are completely in support of the Learning College Model. Due to the nature of computing, our faculty must be in continuous learning mode and fully engaged and supportive of each other in order to keep up with current technology. Specifically, we support these characteristics of the Learning College Model:

- a. *Focus is on the individual; it is a college for and about the individual learner.*

Each CS faculty member works in the Hyman Hall student lab area directly tutoring students with their unique problems in writing computer programs an average of 5 hours per week.

- b. *More options for students are better; experimentation and innovation are encouraged and supported.*

We let students know that they can go beyond the minimum requirements for programming problems assigned and we help them to reach their goals. This is important because we get a broad range of students with a variety of backgrounds and preparation in the same classes. For example it is not uncommon to have a student fresh out of high school in the same class with a professional in the computer industry and another with a master's degree in a field such as math or engineering.

- c. *Engagement in collaborative learning; learners are active, not passive vessels being filled.*

Our classes are taught in a facility where each student has their own computer used during class to try out the new techniques immediately after or interspersed with the lecture. This is beneficial because many people do not realize what questions to ask until they actually try to apply the techniques directly.

Many classes already include group projects and effort is underway to add this component to several others (see the SLO matrix).

- d. *Everyone is a facilitator of student success.*

The CS faculty is lucky to have excellent support from lab assistants in Hyman Hall that devote themselves to helping students succeed. We all know that the students are our only reason for being here!

We interact with IT staff on an almost daily basis, getting feedback, and furthering college goals as well as student goals by improving our knowledge about applications, infrastructure, and lab issues as we help them to prioritize work for maximum effectiveness. More collaboration can and should be done in this area.

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- e. *Documentation: feedback, assessment and adjustment are ongoing quality processes.*

This review process formalizes our work in studying ways to make our CS program better each year by observing students and the patterns of learning that show the greatest student success rates.

- *If there are plans for the program to support other college goals, specify these plans.*

In the area of sustainability and energy conservation we have discussed participating in studies to engage students in an understanding of using computers in a socially responsible way.

3. Program Student Learning Outcomes

- Define a limited number (recommend 10 or less) of student learning outcomes at the program level.

Program Student Learning Outcomes

#1: General Ed Requirement:	Think logically and critically to solve problems; explain conclusions; and evaluate evidence, or critique the thinking of self and others.
#2: Software Analysis:	Identify, analyze, and document the requirements specifications for typical software projects and design techniques to create a solution to the problem.
#3: Software Implementation:	Apply software development techniques that use the correct syntax and semantics of a programming language to write the source code to implement and test/debug a specified design.
#4: Communication and Organization:	Exhibit professional behavior and work habits, demonstrate the ability to work in teams, and effectively communicate project design.
#5: Fundamental Computer Science Concepts:	Demonstrate knowledge in fundamental computer science concepts in areas such as history of programming languages and computing, software design, operating systems, networks, information management systems, and professional and ethical responsibilities.
#6: Computer Organization:	Critically examine the basic concepts of computer organization and architecture, CPU, computer memory, I/O fundamentals, and machine language.
#7: Discrete Mathematics:	Investigate functions, relations, sets, simple proof techniques, Boolean algebra, propositional logic, digital logic, elementary number theory, and the fundamentals of counting.
#8: Internet-Centric:	Demonstrate the ability to use Internet software tools and network protocols to implement client/server applications.
#9: Program Awareness	Understand CS program offerings such as degrees, certificates, and career advancement courses.

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Alignment Matrix

Course	#1	#2	#3	#4	#5	#6	#7	#8
101: Intro to Computers	x			x	x	x		x
102: Intro to Programming	x	x	x		x			x
104A: Visual Basic.NET	x	x	x		x			
104B: Advanced Visual Basic.NET	x	x	x	x	x			x
104C: ASP:NET	x	x	x		x			x
104D: Web Services for .net	x	x	x	x	x			x
113: Discrete Math							X	
116: Object-Oriented Prog.	x	x	x		x			x
117: Intro to Wireless Prog	x	x	x		x			
118: Intro to Assembly	x		x		x	x		
121: Applied Programming: C++	x	x	x	x	x			x
122: C#.NET	x	x	x		x			x
124: Data Structures	x	x	x		x			
125: Intro Prog – Java	x	x	x		x			x
126: Internet Security	x	x						x
129A: Software Testing	x							
130: System Analysis	x	x		x				
131: Comp in Biotech	x	x			x			
132: DNA Computing	x	x			x			
133: SAS Programming	x	x	x	x	x			
137: Intro to SQL and PL/SQL Prog	x	x	x	x				
139: Data Mining	x	x	x	x	x			
152: Data Communication	x				x			x
146: Intro to Linux								
147: UNIX Shell Programming	x	x	x		x			x
149: Perl and System Admin	x	x	x	x	x			x
152: Data Communication			x		x			x
157: TCP/IP			x		x			x
162: XHTML	x							x
170: Java Programming	x	x	x	x	x			x
172: Servlets and JSP	x	x	x	x	x			x
173: J2EE adn EJB	x	x	x	x	x			x
175: Script Languages	x	x	x					x
176: CGI with perl	x	x	x					x
177: E-Commerce				x	x			x
178: XML	x	x	x	x				x
179: ColdFusion/Macromedia	x	x	x					x

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- *Indicate the process used to determine the student learning outcomes. Indicate any rationale for maintaining or changing established outcomes. Program faculty is encouraged to work together to reach consensus when defining the program student learning outcomes.*

Bi-weekly brain-storming sessions on program review issues have been set up for CS faculty during the 2005 Fall semester. Faculties from CAOT, Multi-Media, and NTSA join the group occasionally, where we share ideas and achievements in our respective program reviews.

The program SLOs and alignment matrix above result from these meetings and reflect, in the opinions of the faculty a realistic first look at the new structure. SLO's were defined, based on the department's own vision of the computer science field, together with national standards such as ACM/IEEE and the state mandates, such as the LDTP (Lower Division Transfer Pattern) for CSU (IMPAC).

As demonstrated in the matrix, the student outcomes are all-inclusive, supporting content of any class within the department, though individual classes may address any number of SLO's.

- *Design assessments to measure learning outcomes. To accomplish this, the following may be considered:*
 - *Identify outcome(s) to measure.*
 - *Clarify purpose for the assessment.*
 - *Determine assessment method to employ and delineate performance standards.*
Examples to consider: capstone course, vendor or industry certification examination, institutional or departmental testing, portfolio assessment, performance assessment of behaviors a student should be able to competently perform by the end of the program, skills assessment, culminating project, placement tests used for course entry and exit decisions, other.

The following assessment method has been established for this round of the program review:

The goal is to provide one or two questions per SLO. These assessment questions will be adapted by the instructor(s) responsible for the particular class and included in the testing methods already in place for the course.

The resulting testbank of SLO questions will be kept in a common online database shared by the CS faculty. CS and NTSA will develop the online database jointly and incorporate potential broader college needs for eventual use by other departments.

- *Decide type of assessment data to be collected.*
Examples to consider: course retention and course completion rates, degrees and certificates awarded, graduates' transfer rates, success in another institution, employment data, student program evaluation surveys, student satisfaction surveys, other.

In addition to selected questions targeting specific program SLO's, inserted within existing class, we will tabulate the following statistics:

- a. *Course retention*
- b. *Course completion rates*
- c. *Degrees and certificates awarded*
- d. *Graduate transfer rates*
- e. *Student program evaluation surveys*
- f. *Student satisfaction surveys*

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We plan on assessing all of the above with the help of our available DataMart data and student surveys.

About the DataMart information, a problem needs to be overcome in the fact that the same 'Top Code' has been applied to all older classes, which represent the major portion of CS offerings. Also, these Top Codes do not differentiate between classes taught by NTSA and CS.

We are looking into the possibility of porting the DataMart raw data into our own database format in order to query results about individual courses and sections more precisely.

On the evaluation of *student program and course satisfaction*, we created and disseminated a survey with the following questions for each certificate and degrees (find list of certificates and degrees in part 5 of this report):

Name of Certificate or Degree
Short introduction of Certificate or Degree
List of required classes

About the certificate, I am:

- done.
- planning on getting it.
- aware of it and interested.
- not aware of it but I'd like to learn more.
- not aware of it and not really interested.
- aware of it but not interested in getting it.

Note that the order of the questions (from first to last) will give us a bar graph result showing interest in the certificates and degrees toward the top and a lack of interest toward the bottom.

See results below.

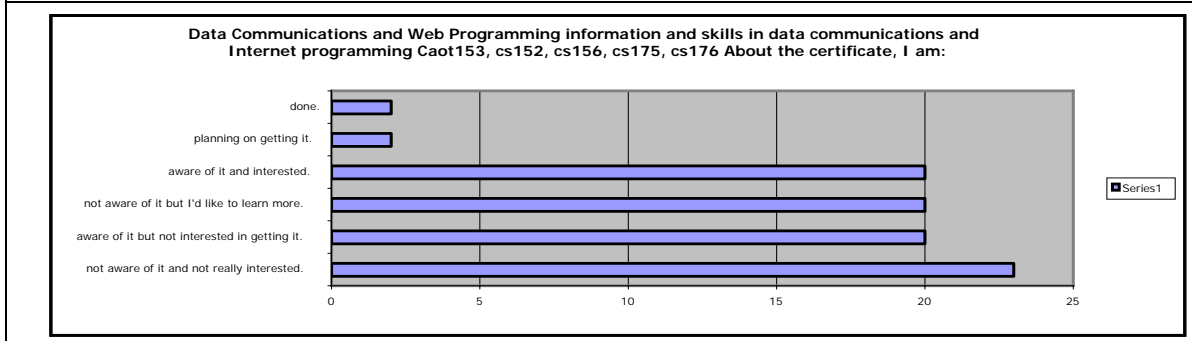
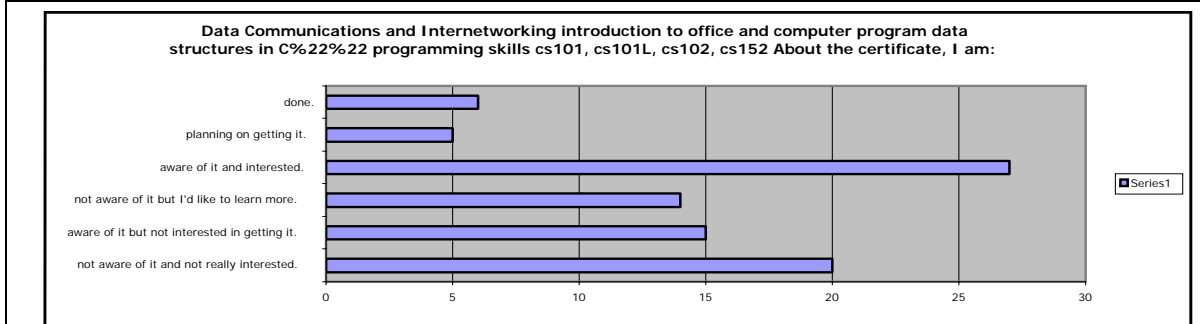
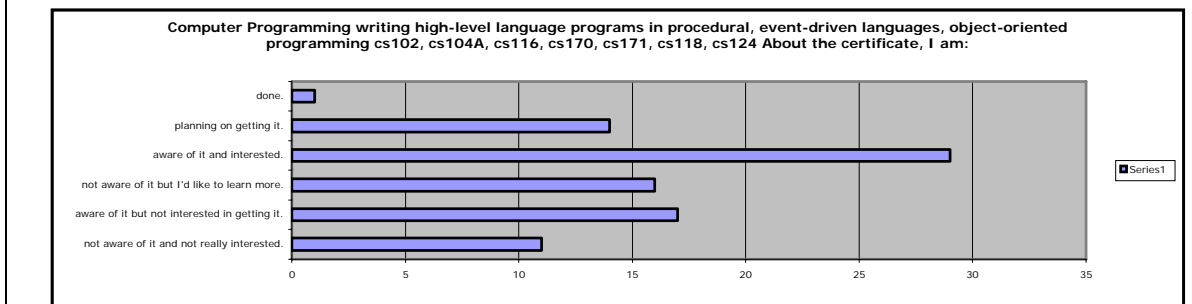
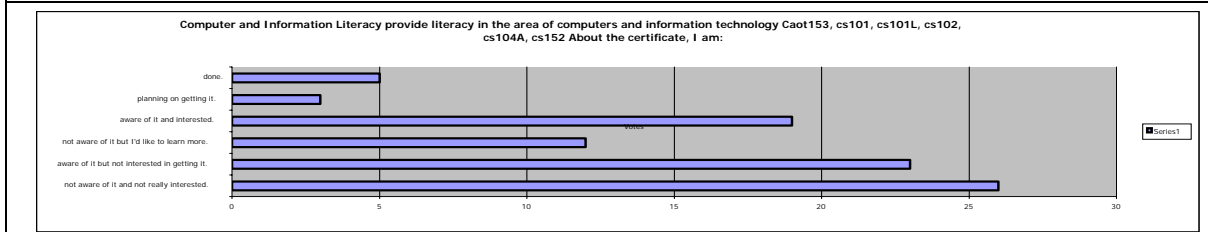
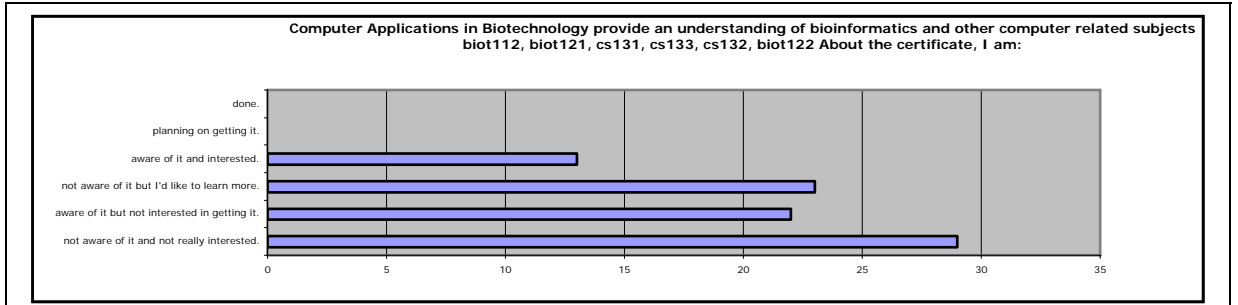
4. Assessment of Student Success in Reaching Program Outcomes

- *Assess student level of achievement for selected learning outcomes using stated assessment strategies. Analyze changes in data, identify trends and provide possible contextual explanations for these changes.*

Following is the result of an initial survey about student and interest of our certificates and degrees. The sample of students include those from the cs101, and cs149. This sample represents a wide spectrum of interest, from the non-CS major, CS majors, and professionals from the industry.

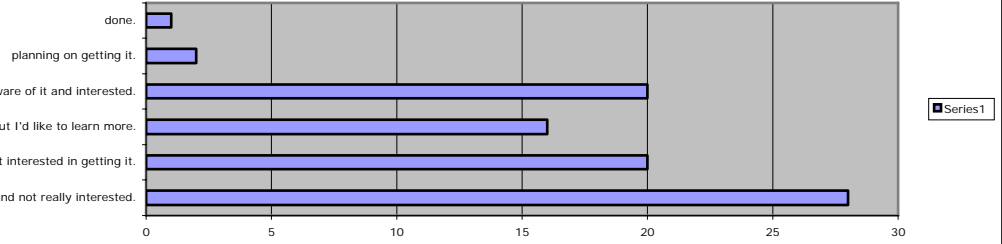
Note, once again, that the order of the bars chart indicates level of interest beginning with those who have actually completed the certificate, continuing with 'planning on getting it' and 'aware and interested' to lack a of interest toward the bottom, where the bottom bar represents those who are aware of the certificate but not interested, etc.

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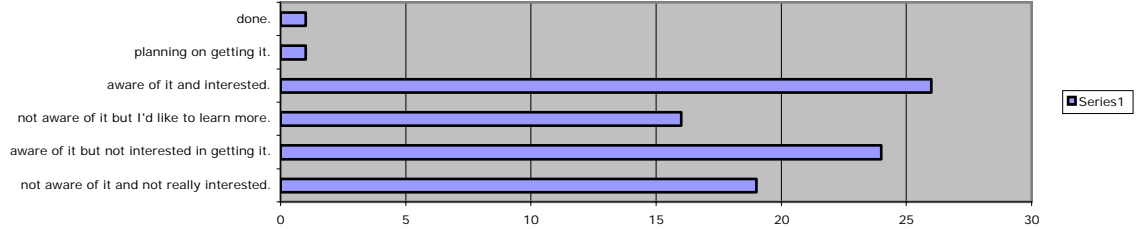


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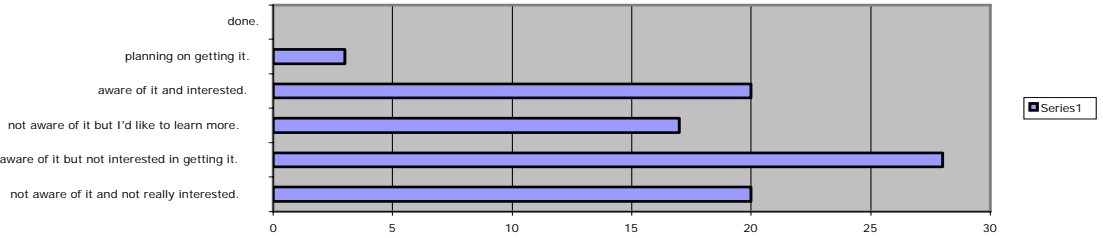
Internet Applications Development knowledge and skills in Internet applications programming and development cs156, cs170, cs171, cs175, cs178 About the certificate, I am:



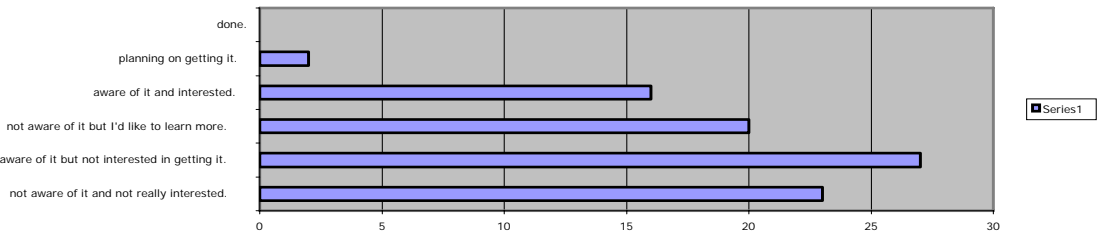
Java Developer develop advanced Java programs and applications for the client-server computing, the Internet, and the Web Services with JSP, J2EE, and EJB cs170, cs172, cs173, cs178 About the certificate, I am:



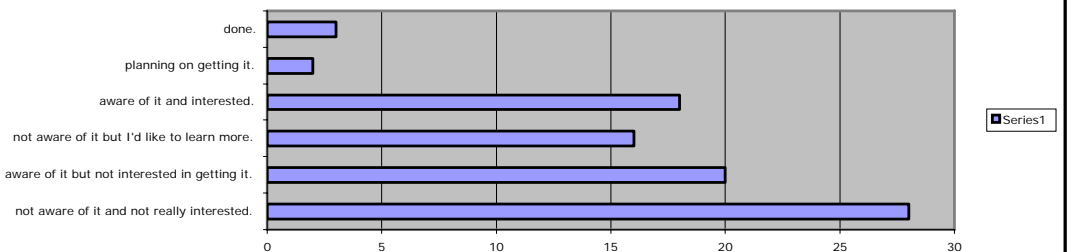
.NET Programming I develop Windows applications and Web Services and applications Caot145, cs104A, cs122, cs104B, cs178 About the certificate, I am:



.NET Programming II develop Windows applications and Web Services and applications cs104C, cs104D, cs162, cs175, cs126, cs180A About the certificate, I am:

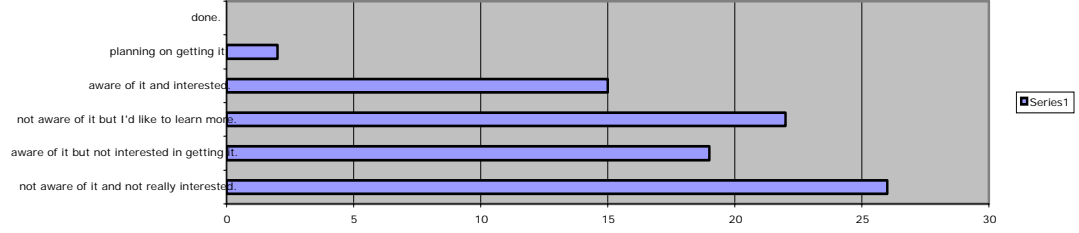


VB Programming introduction to office and Visual Basic.NET programming skills cs101, cs101L, cs104A, cs152 About the certificate, I am:

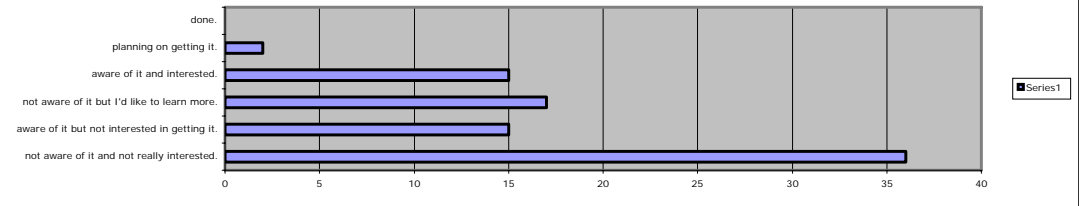


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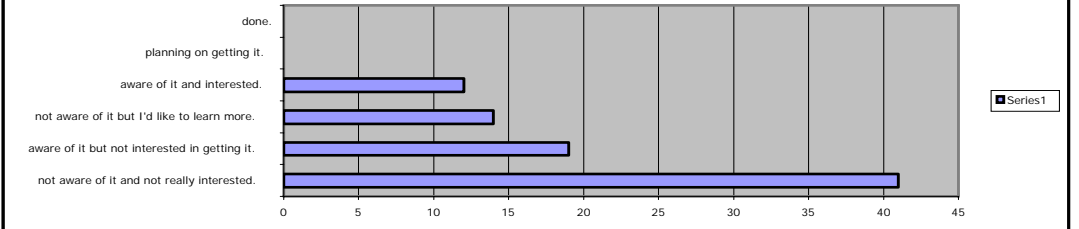
Web Infrastructure specializes on Web server administration, the backbone of the Web cs180, cs180B, cs185A, CS185B, cs104D, cs137, cs157, cs185E About the certificate, I am:



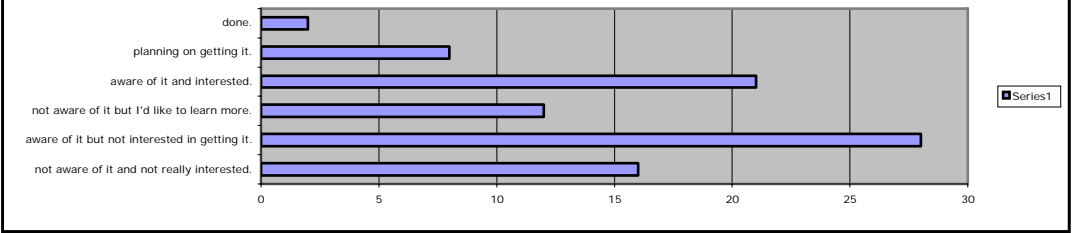
Web Delivery specializes on programming languages currently driving the data on the Web cs104A, cs104B, cs104C, cs121, cs122, cs149, cs149, cs170, cs171, cs172, cs176 About the certificate, I am:



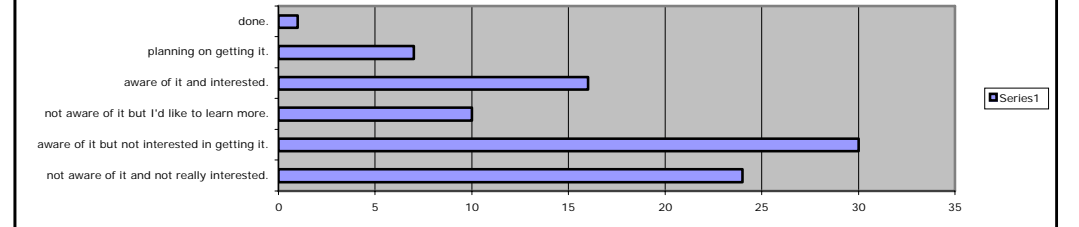
Web Content specializes on the user interface aspect of the Web cs162, cs179, mm102, cs175, cs179, mm103A, mm103B About the certificate, I am:



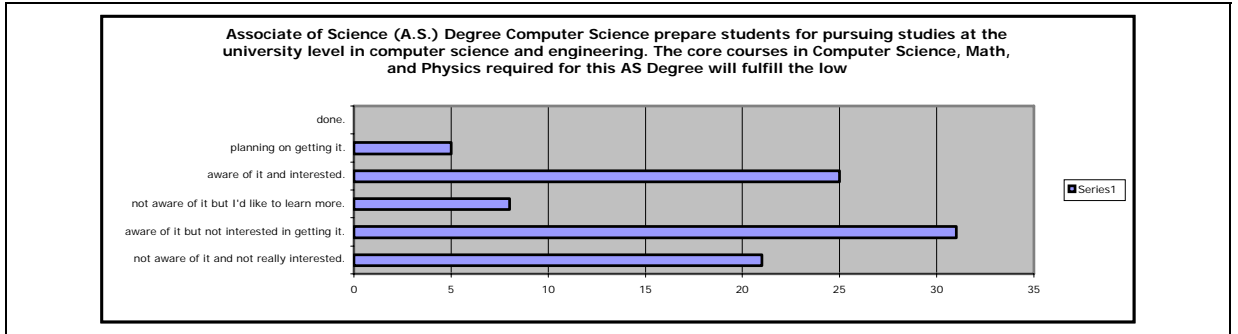
Associate of Arts (A.A.) Degree and Certificate of Achievement Computer Studies Option #1 - Computer Programming (Software Development/Computer Science Transfer) Cs101, cs102, cs113, cs116, cs118, cs124, cs170, cs152 About this degree, I am:



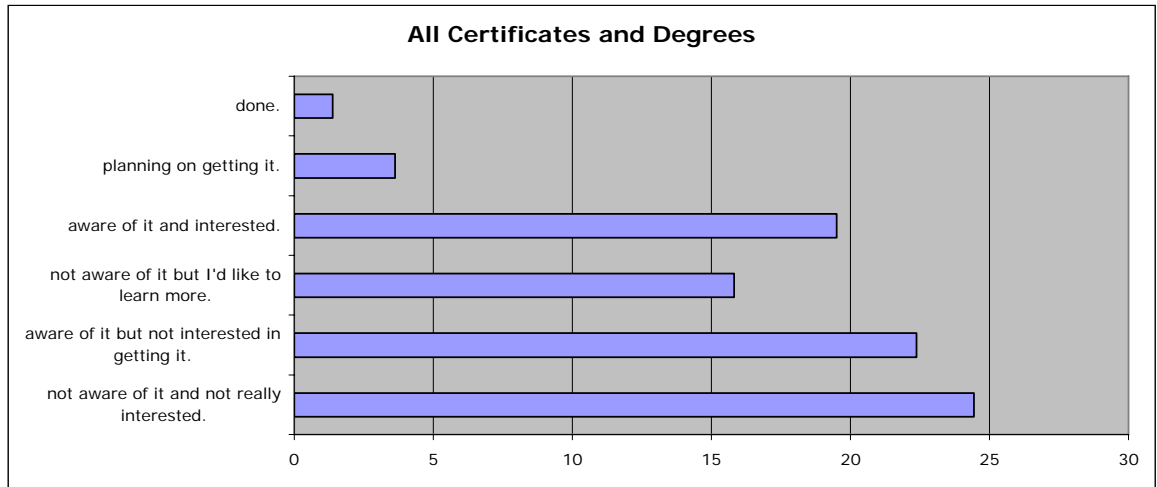
Associate of Arts (A.A.) Degree and Certificate of Achievement Computer Studies Option #2 - Computer Programming (Internet/Web Programming) Cs101, cs104A, cs104B, cs113, Math156/166, cs149, cs176, cs152, cs156/175, cs170, cs171 About this degree, I am:



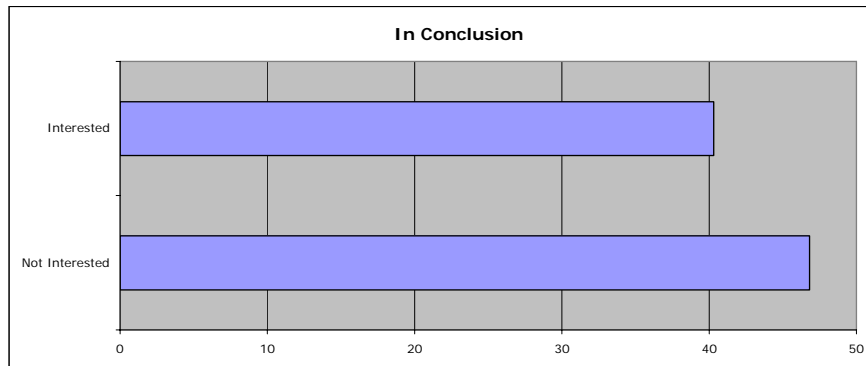
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General responses for all certificates and degrees



Consolidating the above between those who are interested and those who are not, the result shows that our certificates and degrees offerings are, on the average, less interesting to the student by 14%.



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5. Assessment of Program Through Review of the Teaching Learning Process.

To accomplish this, the following may be considered:

- *Relevance, appropriateness and currency of student learning outcomes.*

One of our program SLOs, Program Awareness, which states:

Students will understand CS program offerings such as degrees, certificates, and career advancement courses.

aims at consolidating CS offerings of degrees and certificates. These various programs have evolved over time with varying degrees of success, many of which being underused. With the help of our advisory committee and student surveys, we will re-evaluate their relevance, weed out those that no longer seem necessary, and rejuvenate those that are viable.

Here is an abbreviated list of present certificates and degrees:

- ❑ **Computer Applications in Biotechnology**
provide an understanding of bioinformatics and other computer related subjects
biot112, biot121, cs131, cs133, cs132, biot122
- ❑ **Computer and Information Literacy**
provide literacy in the area of computers and information technology
Caot153, cs101, cs101L, cs102, cs104A, cs152
- ❑ **Computer Programming**
writing high-level language programs in procedural, event-driven languages, object-oriented programming
cs102, cs104A, cs116, cs170, cs172, cs118, cs124
- ❑ **Data Communications and Internetworking**
introduction to office and computer program data structures in C++ programming skills
cs101, cs101L, cs102, cs152
- ❑ **Data Communications and Web Programming**
information and skills in data communications and Internet programming
Caot153, cs152, cs156, cs175, cs176
- ❑ **Internet Applications Development**
knowledge and skills in Internet applications programming and development
cs156, cs170, cs172, cs173, cs175, cs178
- ❑ **Java Developer**
develop advanced Java programs and applications for the client-server computing, the Internet, and the Web Services with JSP, J2EE, and EJB
cs170, cs172, cs173, cs178
- ❑ **.NET Programming I**
develop Windows applications and Web Services and applications
Caot145, cs104A, cs122, cs104B, cs178
- ❑ **.NET Programming II**
develop Windows applications and Web Services and applications
cs104C, cs104D, cs162, cs175, cs126, cs180A
- ❑ **VB Programming**
introduction to office and Visual Basic.NET programming skills
cs101, cs101L, cs104A, cs152
- ❑ **Web Infrastructure**
specializes on Web server administration, the backbone of the Web
cs180, cs180A, cs180B, cs185A, CS185B, cs104D, cs137, cs157, cs185E
- ❑ **Web Delivery**
specializes on programming languages currently driving the data on the Web
cs104A, cs104B, cs104C, cs121, cs122, cs149, cs149, cs170, , cs172, cs173, cs176
- ❑ **Web Content**
specializes on the user interface aspect of the Web
cs162, cs179, mm102, cs175, cs179, mm103A, mm103B

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Associate of Arts (A.A.) Degree and Certificate of Achievement

Computer Studies

Option #1 - Computer Programming (Software Development/Computer Science Transfer)

Cs101, cs102, cs113, cs116, cs118, cs124, cs170, cs152

Option #2 - Computer Programming (Internet/Web Programming)

Cs101, cs104A, cs104B, cs113, Math156/166, cs149, cs176, cs152, cs156/175, cs170, 2

Associate of Science (A.S.) Degree

Computer Science

Prepare students for pursuing studies at the university level in computer science and engineering. The core courses in Computer Science, Math, and Physics required for this AS Degree will fulfill the lower division major requirements at many universities.

Cs102, cs113, cs116, cs118, cs124, Math101A,B, Math103, Phis140,1, Chem101A,B

Initial feed-back from our advisory committee:

We realized the important contribution that our advisory committee could make to improve our offerings of certificates and degrees because of their real-world knowledge of how hiring managers view applicants that have them. We presented what we currently offer at our advisory meeting this semester (Fall 2005) and opened the discussion. The results were extremely helpful and have given us a clear picture of how to consolidate the many overlapping-content certificates into just a few to clarify for students and hiring managers what they really indicate about what the student is prepared for.

We see 3 major tracks: Java, .NET, and Open-Source with each having a component that includes database access and web interaction.

We plan to expand the ability of our advisory committee to help us keep the program relevant by exploring the idea of “virtual” meetings. That is, keep the communication lines open using weblogs or other permanent place for discussions about our program to take place.

-
- *Assessment of teaching strategies.*
 - *Results of classroom assessment techniques.*
 - *Assessment of curriculum revisions, if applicable.*
 - *Assessments of how assignments, criteria, and standards for sequenced courses relate.*
 - *Assessment of trends in student scores over time, including strengths and needed improvement.*
Adequacy of resource utilization; include requests if there are new resources needed.

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6. Assessment of Program Improvement Since Previous Program Review

(Note this step will be implemented during the second program review cycle using these guidelines)

- *Discuss results of the implementation of the recommended outcome measures.*
- *Analyze how these results have promoted student success in reaching program learning outcomes and/or contributed to program improvement.*
- *Analyze discrepancies between outcomes and performance levels.*
- *Analyze the impact of the addition of resources, if any.*
- *Determine strengths to be continued and areas for improvement (opportunities for innovation).*
- *For areas needing improvement, state specific plans including outcomes measures and a time frame for implementation.*

Although the previous items will be addressed in our next review, it is worthwhile to briefly analyze the previous review to reflect on the changes that have taken place. We have experienced a downturn in enrollment over the past few years—as have similar CS programs in almost all other schools. It appears that this trend is a reaction to reduced employment opportunities as major companies have curbed hiring and outsourced many IT-related jobs. There are indications that this trend is going to reverse itself as shortages of qualified CS graduates result from the smaller enrollments. In our last program review, we reported increases from 2 full-time CS faculty in 1997 up to 6 full-time in 2001. Now, in 2005, we have 4 full-time CS faculty. There have been similar increases and decreases in adjuncts. In our last review we reported the creation of several new programs to support networking courses. These have become successful enough to warrant splitting Computer Studies into two departments: Computer Science and Computer Technology & Networking. In our last report we also commented on the lack of adequate facilities for our students to do their lab work. It is worth noting that this problem has been solved; we now have one of the best facilities anywhere to that purpose! The new Hyman Hall Instructional Computing Center is a wonderful resource that allows us to teach our classes with excellent multi-media support and a computer on every desk!

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The following spreadsheet shows the data gathered from the Chancellor's Office Data Mart:

Ohlone College
Instructional Basic Program/Discipline Review Data
2005-06

Computer Studies														
	Data Source	2002-03				2003-04				2004-05				
		Fall	Spring	Summer	Annual	Fall	Spring	Summer	Annual	Fall	Spring	Summer	Annual	
Enrollment Data:														
Courses Offered	Datatel	54	61	31	77	60	69	33	87	46	46	23	67	
Sections Offered	Datatel	102	99	37	238	93	96	38	227	65	64	29	158	
Enrollments (duplic., credit only)	XWFR	2013	1903	698	4614	1701	1571	502	3774	1002	1051	447	2500	
FTES (credit only)	Data Mart	298	311	109	718	236	216	74	526	134	147	DTNA ⁷		
Full Time Faculty ¹	Instr. Office					10				10				9
FTEF - Full Time ²	Datatel	11.6	10.5	2.4		10.7	10.4	2		9.2	8.6	2.3		
FTEF - Adjunct	Datatel	8.2	7.6	3.4		5.8	6.9	3		3.2	3.2	1.6		
WSCH/FTEF (credit only)	XWFR	455	452	505		471	397	517		372	411	498		
Student Success Data:														
Percent Retention ³	Data Mart	78	81	84		76	83	86		79	76	DTNA ⁷		
Percent Success ⁴	Data Mart	68	72	76		65	73	79		71	68	DTNA ⁷		
Degrees Awarded	Data Mart					29				13				20*
Certificates of Achievement ⁵	Data Mart					20				9				11*
Certificates of Completion ⁶	Data Mart					8				9				10*

Notes:

1. Full Time Faculty = the number of filled positions whose primary assignment is in this department (includes temporary full time faculty)
2. "FTEF - Full Time" includes overload assignments and fulltime faculty from other departments teaching in this discipline
3. Retention = Percent of students from census who remain through end of term
4. Success = Percent of students from census who remain through end of term and receive grade of A, B, C, or Credit
5. Certificates of Achievement: 18 units or more listed on Chancellor's Office Program Inventory
6. Certificates of Completion: 17 units or less, locally approved
7. DTNA = Datamart Term Not Available, information should be posted by Oct 1

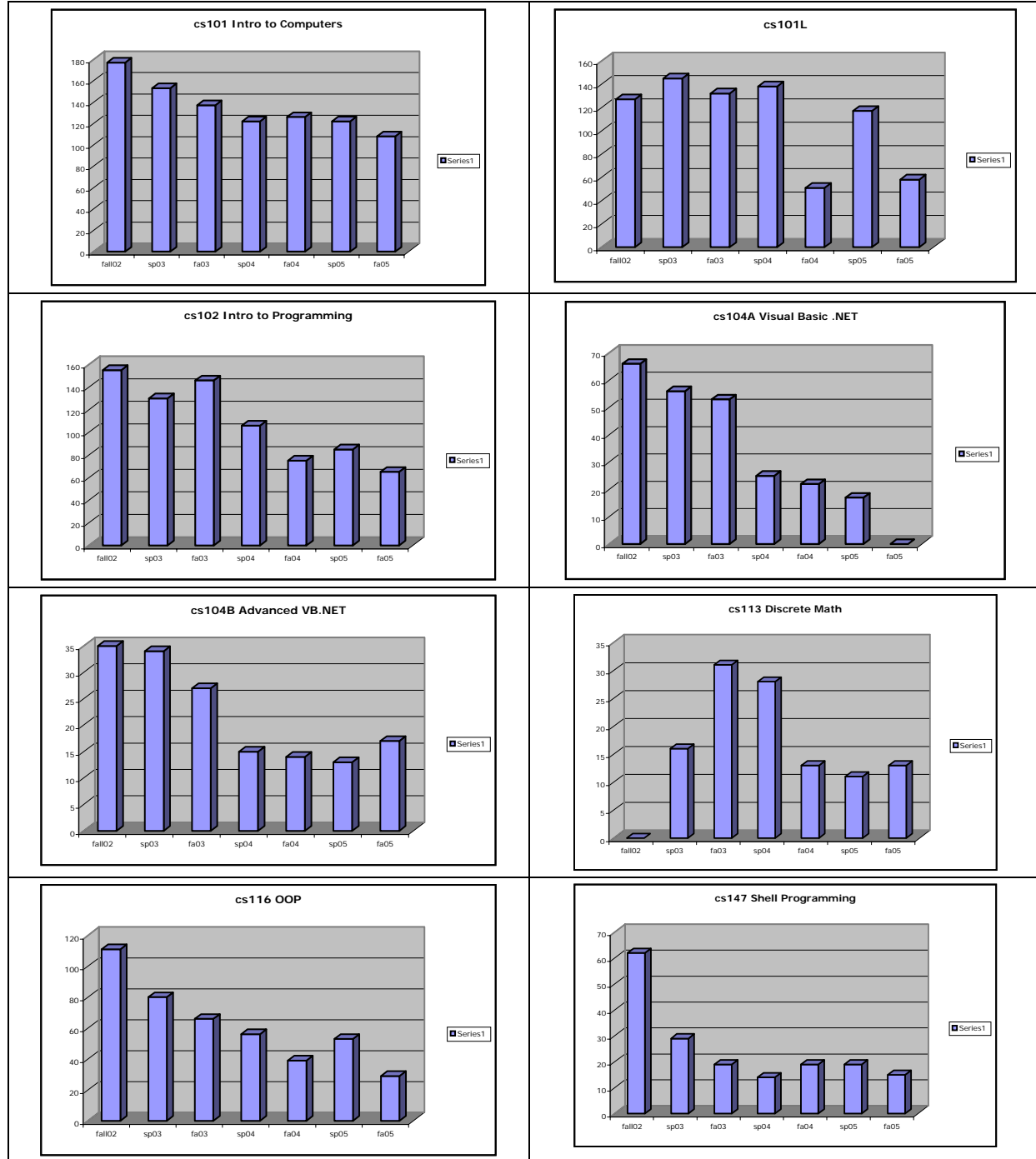
* Awards are still being processed for this year, DATAMART updates will be adjusted 10/1 and 11/1

Analysis of this data shows that despite lower enrollments the retention rate is similar across the semesters. We would like to focus on ways to improve this rate.

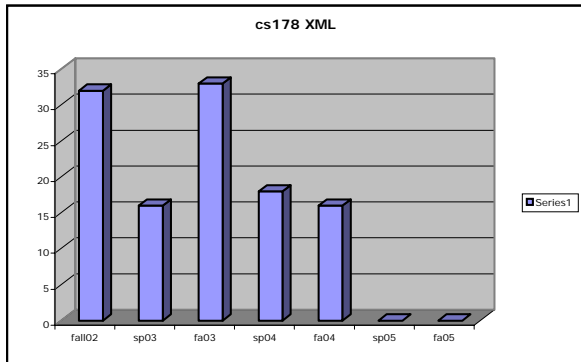
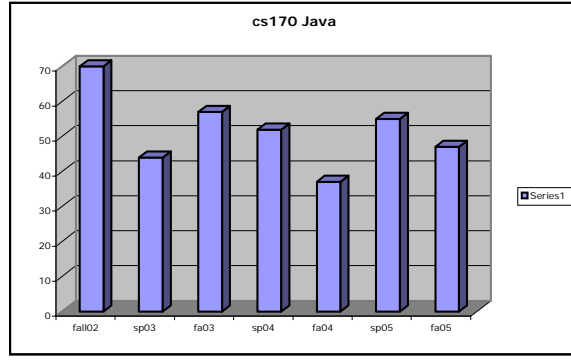
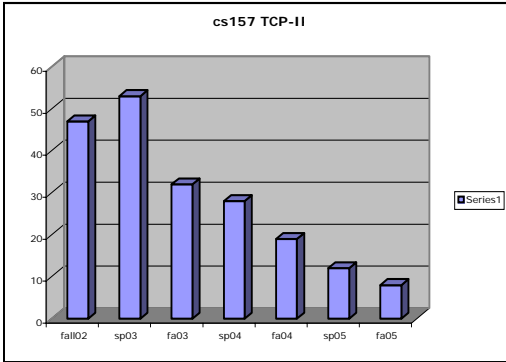
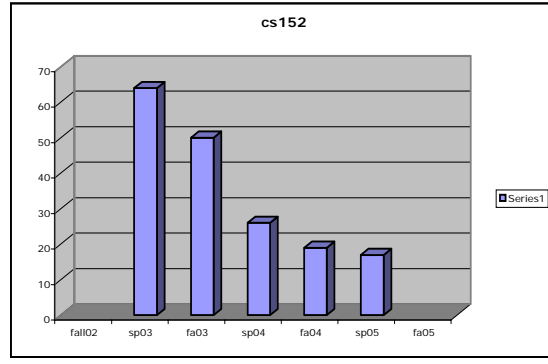
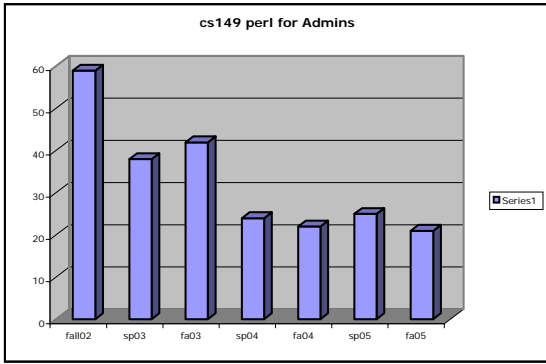
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Following are charts derived from Data Mart following the enrollment of individual CS classes from fall 2002 to Fall 2005.

Note: the enrollment figures for Fall 2005 reflect mid-semester enrollment from WebAdvisor thus will not match the Data Mart 'beginning of semester' numbers, therefore will be relatively slightly lower than should be.

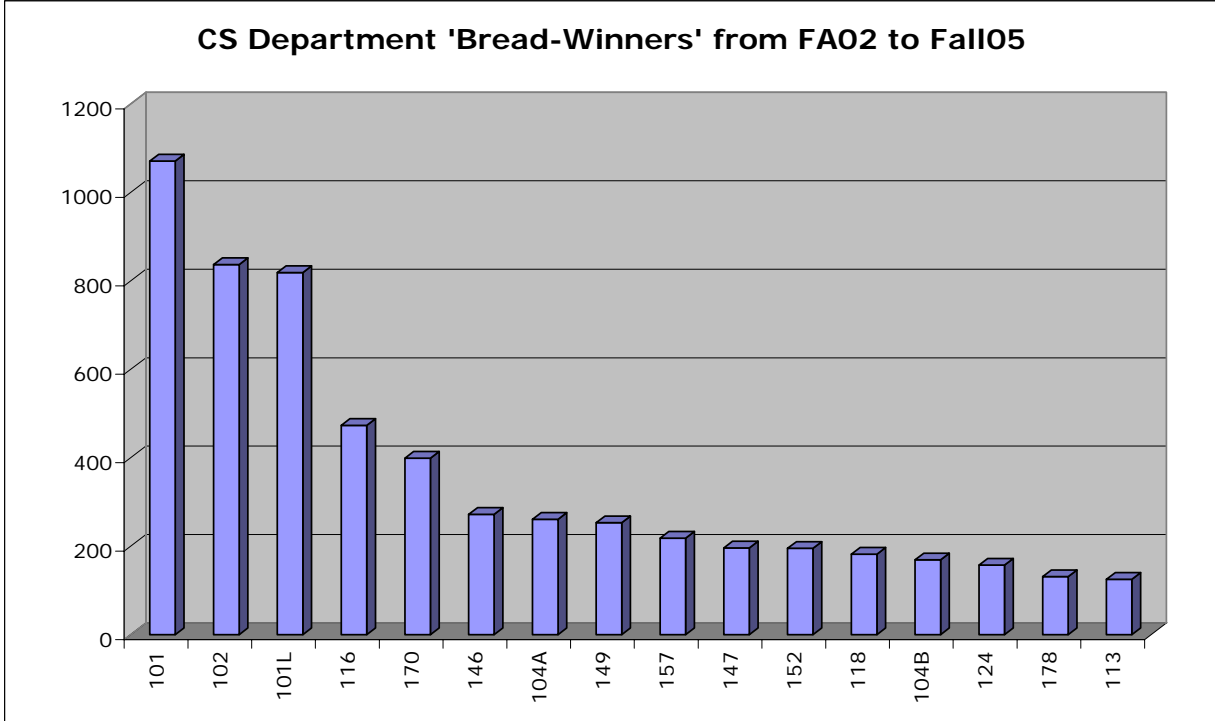


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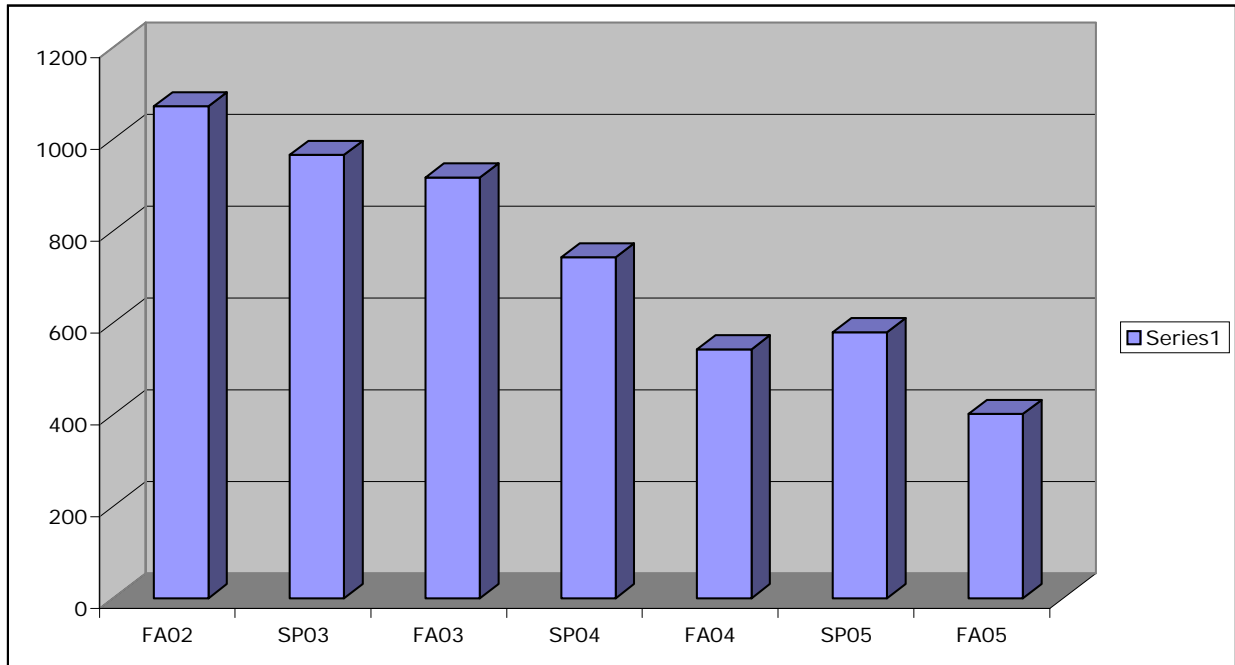


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Overall Enrollment of each CS class from Fall 2002 to Fall 2005-11-05

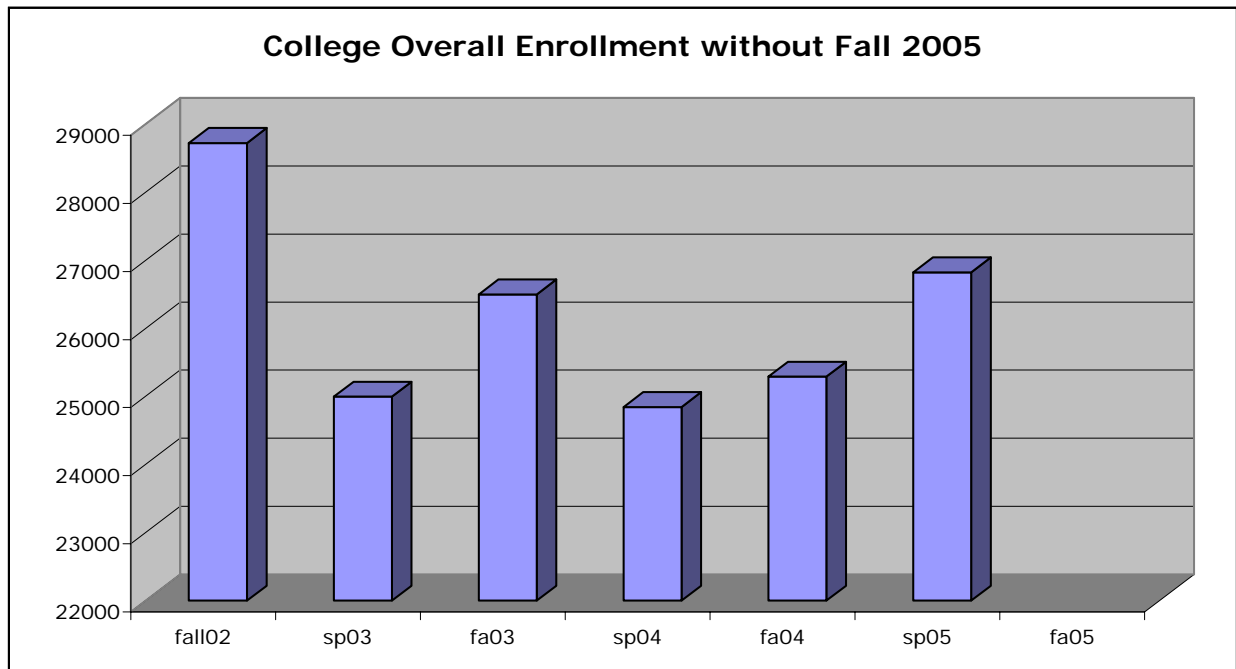


CS Department Overall Enrollment from Fall 2002 to Fall 2005-11-05



Instructional Program/ Discipline Review Report Guidelines, 2005-06

College Enrollment Figures from Fall 2002 to Spring 2005 from XWFR



7. Describe Review and Dissemination Team Involvement

Members of the Review and Dissemination Team: David Topham, Jon Degallier, and David Bradford met twice weekly to review and develop the program review. Xisheng Fang and Yong Gao met at least twice to review the program and make suggestions.

The Review and Dissemination Team met as group in conjunction with the bi-yearly Program Advisory Committee, where Student Hudson Asiema and community member Arleen Ong reviewed and approved our work in progress.

The members of the Program Review are listed as follows

- Program Coordinator: Xisheng Fang
- Program faculty member: David Topham
- Program faculty member: Jon Degallier
- Program faculty member: Yong Gao
- Faculty member from other program: David Bradford
- CS Student: Hudson Asiema
- Community member: Arleen Ong

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