Community College of Philadelphia

The Path to Possibilities™

STUDENT OUTCOMES COMMITTEE OF THE BOARD OF TRUSTEES

Thursday, February 2, 2012
1:30 p.m. – 2:45 p.m.
Room M2-34

AGENDA

(1) 1:30 p.m. Public Session

	(a)	Approval of the Minutes of January 5, 2012	(A)
1:35 p.m.	(b)	Recommendation for Sustained Excellence Recognition for Dental Hygiene Program	(A)
1:50 p.m.	(c)	Academic Program Audit: Computer Science Program	(A)
2:25 p.m.	(d)	Community College Baccalaureate	(I)

STUDENT OUTCOMES COMMITTEE OF THE BOARD OF TRUSTEES

MINUTES
Thursday, January 5, 2012
1:30 p.m. – M2-34

Presiding: Dr. James Roebuck, Jr.
Present: Dr. Stephen Curtis, Ms. Varsovia Fernandez, Dr. Judith Gay, Dr. Samuel Hirsch, Ms. Dorothy Sumners Rush

Guests: Dr. Mary Anne Celenza, Ms. Theresa Grady, Mr. Brenton Webber

(1) Executive Session

There was a discussion of Honorary Degree nominations submitted by Board members.

(2) Public Session

(a) Approval of Minutes of December 1, 2011

The minutes were accepted.

(b) Modified Program Audit: Dental Hygiene Program

Dr. Celenza presented positive highlights reflected in the modified Dental Hygiene Program Modified Audit: (1) faculty attention to student retention; (2) faculty attention to curricular revision; (3) faculty attention to program accreditation standards; and, (4) faculty attention to the community. Dr. Celenza also mentioned a recent development, not reflected in the audit – a discussion about having a series on CCPTV. Finally, Dr. Celenza identified the next steps for the program: (1) increase efforts to help students persist; and, (2) increase the use of technology.

Board members wanted to know how people find out about the program. Ms. Grady responded that some are dental assistants who want to move up to the position of dental hygienist. Some approach the College thinking that the program is for dental assisting. Not many come to the program straight out of high school. Ms. Grady said that she has found through high school visits that it is not initially seen as an attractive career field by students. Dr. Hirsch stated that that when potential students visit the College, they do a rotation through the health career labs and have an interactive experience of making a model. That approach has been helpful. Ms. Grady was also asked about other career opportunities for dental hygienists. She responded that some dental hygienists practice on their own and some go into areas like sales.

Dr. Curtis mentioned that two things that stand out in his mind about the dental hygiene program are the free dental clinic that the program operates and the alumni survey showing that the average salaries of graduates tend to be at the top of the list.

There was a discussion about student persistence in the program – do students fail to complete the program because they do not need to graduate to practice? Ms. Grady stated that in order to sit for the credentialing exam, students must complete an accredited program; after getting a license, there is a requirement for continuing education to maintain it. The program is challenging and life circumstances sometimes interfere with program completion. Faculty, however, are very engaged in thinking about student success and constantly survey students to check on them.

Motion: The Student Outcomes Committee recommends that the Board of Trustees accept the Dental Hygiene Modified Program Audit and re-certify the Dental Hygiene Program for five years.

(c) Math Audit Update

Dr. Celenza stated that Department Head Brenton Webber would report on the follow up to the follow up report that the Mathematics Department last provided to the Student Outcomes Committee of the Board. Mr. Webber stated that the department had completed the follow up to all of the recommendations from the audit that are currently due, including: (1) creation of an enrollment management plan; (2) creation of a faculty improvement plan; (3) creation of an assessment plan; and, (4)completion of course documentation.

There was a discussion of Math 263, which has been low-enrolled in the past. According to Mr. Webber, the Department now has a dual enrollment effort for Math 163 and 263 with Masterman High School. Other ways to attract enrollment were discussed including: College advertisements; the Colonial Math Challenge sponsored by the Department for high school students; speaker series; encouraging students to consider getting a joint degree. Also, some students who have participated in a supplemental instruction initiative have re-discovered an interest in mathematics. Other ideas from the Student Outcomes Committee included partnering with businesses to sponsor events and connecting with students through events like the City-wide chess tournament.

Action: The Student Outcomes Committee recommends accepting the Mathematics Audit follow up report and recommends that the Board of Trustees require a follow-up report Spring 2013 on implementation of the enrollment management plan and the assessment plan.

(d) Presentation of Student Outcomes at Board Retreat

This topic was not discussed.

The meeting was adjourned.

(3) Next Meeting

The next meeting of the Student Outcomes Committee of the Board is February 2, 2012 at 1:30 p.m. in conference room M2-34.

Attachments

Minutes of December 1, 2011
Modified Program Audit: Dental Hygiene Program
Mathematics Audit Update Report

Community College of Philadelphia

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OFFICE OF ACADEMIC AFFAIRS

M E M O R A N D U M

TO: Student Outcomes Committee of the Board
FROM: Judith Gay
DATE: January 26, 2012
SUBJECT: Recognition of Sustained Academic Excellence

In June 2008, The Board of Trustees approved standards and a procedure for the Recognition of Sustained Academic Excellence by the Board of Trustees. Based on those critieria, I am submitting the Dental Hygiene Program for consideration of this recognition. Dr. Curtis and I have reviewed information submitted by the Dean of Mathematics, Science and Health Careers, Dr. Mary Anne Celenza, and support Dr. Celenza's nomination of the Dental Hygiene Program.

c: Dr. Stephen M. Curtis

Community College of Philadelphia

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Board of Trustees Recognition of Sustained Academic Excellence

1. The recognition is for programs or departments, not for individuals.
2. The recognition is externally validated, such as by certification examination outcomes.
3. The recognition is based on student outcomes.
4. The recognition is for consistent excellent performance for a period of not less than five years.
5. The standard of excellence reflects positive outcomes by at least 90% of the students.
6. The outcomes, over a five year period, reflect the accomplishments of at least 100 students.

Procedure:

1. The responsible dean will nominate the program for consideration, supplying documentation that supports the belief that the program or department meets the criteria.
2. The Vice President for Academic Affairs and President of the College will review the recommendation and, if the review is affirmative, will make a recommendation that the Academic Affairs Committee of the Board recommend acceptance of the nomination to the Board of Trustees.
3. The decision of the Board of Trustees will be final.

Recognition:
A citation identifying the program will be presented at a meeting of the Board of Trustees to program or department representatives.
All full and part time and program staff will be invited to a reception in honor of the program.
Appropriate media will be informed of the recognition.

Passed by the Board of Trustees on June 5, 2008

OFFICE OF ACADEMIC AFFAIRS
1700 Spring Garden Street, Philadelphia, PA 19130-3991·215-751-8351· (Fax) 215-496-6188·http://www.ccp.edu

COMMUNITY COLLEGE OF PHILADELPHIA
DIVISION OF MATHEMATICS, SCIENCE & HEALTH CAREERS
MEMORANDUM

TO: Judith Gay
FROM: Mary Anne Celenza
DATE: January 13, 2012
SUBJECT: Sustained Academic Excellence – Dental Hygiene
Cc: Deborah Rossi
Theresa Grady

I would like to recommend the Dental Hygiene program for recognition in light of its sustained academic excellence. My request is based on the following

1. From 2004 to 2010 the program has had a consistent pass rate above the national average. For four of those seven years the pass rate was 100% on the licensing exam and was above 90% for the other three years. This includes a total of 138 students over a span of seven years.

2. The program continues to maintain high standards of academic excellence for students with very positive outcomes such as
   a. Excellent Job Placement Results - 100% since 2007.
   b. Increasing Student Retention Rates – since 2008 retention rates have increased by 12.5% and are currently above the requirements of the Commission on Dental Accreditation of the American Dental Association. In addition, Fall to Spring and Fall to Fall persistence rates consistently exceed the college-wide rate.

Persistence Rates

Academic Year	Fall to Spring		Fall to Fall	
	Dental Hygiene	College-Wide	Dental Hygiene	College-Wide
2006	90.4%	64.3%	80.7%	36.2%
2007	82.8%	64.2%	81.3%	35.0%
2008	85.7%	64.6%	82.2%	37.1%
2009	98.1%	64.8%	98.2%	38.5%
2010	91.8%	67.0%		

c. Met or exceeded the thresholds for outcome measures as determined by the Commission on Dental Accreditation of the American Dental Association.

2009-2011 Program Outcomes

Category of Outcomes	Dental Hygiene Program Outcomes			Commission Standard
	2009	**2010**	**2011**	
Entering Class	32	32	32	N/A
Graduates with an Associates Degree in Dental Hygiene	23	23	27	N/A
Retention	71.8%	71.8%	84.3%	80%
Pass National DH Board Exam	94.4%	91.3%	100%	75%
Pass NERB Slide Exam	95.4%	96%	100%	80%
Pass NERB Clinical Exam	100%	96%	100%	80%
Employed as a Licensed Dental Hygienist 9 months after graduation	100%	100%	100%	80%

3. The program also has maintained strong, strategic liaisons with area dental agencies which have resulted in recent curriculum revisions that include vital information and skills necessary for future student success in their dental hygiene career. The most recent curriculum revision (2011) has included a course which will educate and train students in the administration of local anesthesia.

4. The faculty have also worked with Corporate Solutions to offer non-credit workshops for current practicing dental hygienists in the administration of local anesthesia. At the completion of the 32 hour course participants are eligible to apply for a Pennsylvania Local Anesthesia permit from the Pennsylvania State Board of Dentistry. The workshop has successfully run twice (Fall 2010 and Spring 2011).

5. The dental hygiene faculty has also worked with Corporate Solutions to offer graduating dental hygiene students the opportunity to take the Northeast Regional Board Examinations (NERB) for Dental Hygienists at Community College of Philadelphia. This initiative has been successfully offered in August 2010 and August 2011.

6. The dental hygiene faculty and students have participated in Sealant Saturday since 2003. Sealant Saturday is a state wide community volunteer event in conjunction with the Pennsylvania Dental Hygiene Association (PDHA) where dental sealants, which are a thin, clear coating, are placed on the occlusal surfaces of the primary teeth to help in the prevention of decay. This effort began in 2003 and to date has a total donated value of services of $961,033. The Dental Hygiene Program at the college has been involved since the beginning and has

donated approximately $4,000 each year in treatment services which include dental sealants, nutritional education and oral hygiene care to the community.

7. The last successful accreditation site visit (Spring 2009) resulted in the renewal of accreditation for the Dental Hygiene program until 2016 with no further reporting requirements.

Thank you for your consideration of this request.

Community College of Philadelphia

Academic Program Audit: Computer Science Program

Division of Business and Technology

Authors:

Linda Hansell
Charles Herbert
Michelle T. Williams
Craig Nelson

November 11, 2011

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I. Executive Summary

The Computer Science program at Community College of Philadelphia is a small, select, and mathematically intense program leading to an Associate is Science in Computer Science degree. The program, which has been in place at the College since 1986, is housed in the Computer Technologies Department of the Division of Business and Technology. The major objective of the program is to prepare students to transfer to Computer Science baccalaureate degree granting programs at four-year colleges and universities.

The original curriculum was based on the fundamentals of Computer Science--programming and algorithm development, the development of data structures, and familiarity with computer architecture. To that end, the program requires the completion of five 4-credit laboratory-based courses: *CSCI 111-Programming and Algorithm Development I, CSCI 112-Programming and Algorithm Development II, CSCI 211-Data Structures, CSCI 212-Computer Architecture and Assembly Language, and CSCI 213-Computer Organization*.

It has not been necessary to modify the Computer Science core within the program because the theoretical basis for the description of the courses has not changed, although minor changes to the degree structure have been made as College-wide degree requirements have changed.

The Computer Science program has averaged 6 graduates over the last 6 years. The program's students are predominantly male between the ages of 22-29 years of age. Black students represent the largest racial/ethnic group in the Computer Science program. In general, the ratio of full-time to part-time students in the program has been close to 50-50.

Four full-time faculty members with an array of expertise in the discipline each teach part of their course load in the program. Part-time instructors rarely teach Computer Science courses. The program is advised by representatives of an over-arching Computer Technologies Department Advisory Committee composed of representatives from industry and four-year colleges and universities.

The program's major strengths include the retention rate which tends to be better than the College average and the satisfaction of current students.

Recommendations for changes to the program include: improving student recruitment and retention, developing formal articulation agreements with transfer institutions, aligning the program's learning outcomes with the new state-wide curriculum guidelines, and seeking program accreditation.

II. Program

Mission

The Associate in Science in Computer Science program is a small select program designed to mirror the first two years of four-year computer science and software engineering curricula, including courses in computer science, math, physics, English, the social sciences and the humanities. The curriculum is math intensive with select admissions standards--including placement in Mathematics 161 or above and English 101 or above.

Major Goals

The major goal of the program is to prepare students for transfer as third-year students to baccalaureate programs in computer science, software engineering and related fields.

History of the Program

The Computer Science curriculum at Community College of Philadelphia was developed in the mid-1980's based on the first two years of the curriculum guidelines for baccalaureate programs in Computer Science published by the Association for Computing Machinery (ACM)[1], the primary professional organization in Computer Science.

In the Fall of 1985 a conference was held at Community College of Philadelphia with the department chairs from eight local four-year colleges in attendance: Drexel University, LaSalle University, Rutgers University, Saint Joseph's University, Temple University, University of Pennsylvania, Villanova University and West Chester University. All of the participating schools agreed in principle to articulation agreements for the program, although only Drexel University signed a formal articulation agreement.

In 1993 the ACM and the Institute of Electrical and Electronic Engineers (IEEE) jointly formed the Computer Science Advisory Board (CSAB), which now serves as the primary body for coordinating accreditation of baccalaureate programs in Computer Science. CSAB member accrediting agencies also include the Accreditation Board for Engineering and Technology (ABET). At the time of our last audit, their standards for accreditation of four-year programs were based on the older course-oriented ACM guidelines. The CSAB guidelines list semester-hours of competency to be included in every baccalaureate degree in Computer Science. Our Associate in Science in Computer Science program was consistent with the first half of a four-year program that met the CSAB standards at the time of our last audit.

Despite the changing nature of computer technology, the fundamental basis for the courses in the program has not changed in the 25 years since the program was established, with two major exceptions. First the degree now requires completion of *CIS 103-Applied Computer Technology* in response to changes in the College's General Education Requirements. Second, the rise of *object-oriented programming (OOP[2])* in the 1990's required course revisions to reflect that change, most importantly, in the programming sequence of courses (CSCI 111, CSCI 112, and CSCI 211). Object-oriented programming is now regarded as the primary approach to professional programming and software engineering.

Changes in the equipment and programming languages used in the courses have occurred in response to technological innovations in computing, such as using newer operating systems and new devices for data storage.

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[1] See the ACM Website at: http://www.acm.org/

[2] For more about object-oriented programming see: http://www.webopedia.com/TERM/O/object_oriented_programming_OOP.html

Description of the Curriculum

The degree centers on five four-credit courses in Computer Science, listed below in their curricular sequence, and a series of Math courses. Students must also complete two physics courses. Originally there were six Computer Science courses, but *CSCI 121-Discrete Structures*, is now offered in the Mathematics Department as *MATH 163-Discrete Mathematics*.

In ***CSCI 111-Programming and Algorithm Development I*** **and** ***CSCI 112-Programming and Algorithm Development II*** students currently use the Java NetBeans programming environment to create computer programs based on algorithms they have designed in response to mathematical and scientific problems. Students also learn to mathematically analyze algorithms for completeness, correctness, and spatial and temporal efficiency.

In ***CSCI 211-Data Structures***, students learn to develop and manipulate a variety of complex object-oriented data structures, such as arrays, queues, stacks, linked lists, trees, and graphs.

In ***CSCI 212-Computer Architecture and Assembly Language***, students learn to write assembly language programs that interface with both the core of a computer's operating system and directly with other electronic hardware. They study the architecture of the Intel 80x86 family of processors for the bulk of the course, but spend some time comparing that family to several other families of processors in widespread use today. Currently CSCI 212 is only offered online, creating a de facto requirement that Computer Science students complete at least one course online.

CSCI 213-*Computer Organization* is a more theoretical course in which students learn about the organization and design of modern computer systems, from simpler topics such as viewing a computer system as a collection of units that are functionally dependent on input, to more complex topics required as a foundation for courses in baccalaureate programs, such as the geometry of N-dimensional hypercubes as the basis for designing modern parallel processing computer systems and the implications of RISC technology (Reduced Instruction Set Computing) on the design of operating system and communications software. *CSCI 212* and *CSCI 213* are most often taken concurrently by students.

The five courses together prepare students to deal with a variety of issues in computer science as they continue their pursuit of a four-year degree. Computer Science 111 and 112 form a strong sequence in object-oriented programming and algorithm development, which leads naturally to Computer Science 211 as a course in the development of data structures. It is impossible to pursue the study of data structures, which lie at the heart of modern computer software on all levels, without a firm grounding in objects and algorithms, since data structures and the algorithms that create and manipulate them are inextricably linked as software objects.

Computer Science 212 and Computer Science 213 are taken together any time after the first programming course to familiarize students with fundamental systems level problems in Computer Science that can be addressed in part by applying skills developed in other courses.

The analysis of the temporal and spatial complexity of algorithms is an important element in the curriculum. For more than fifty years computer scientists have continued to develop algorithms and data structures to deal with a wide range of problems, but it is not enough to simply create a correct algorithm. Algorithms need to be temporally and spatially efficient. As a program's data set grows larger, the amount of time it takes the program to run and the amount of storage space it uses also grow larger. However, has the software been written so that this growth is linear, exponential, or according to some other function? A mathematical foundation in computer science is necessary to foster the development of software with reduced time complexity and efficient use of storage space. The Computer Science core of this curriculum, together with the required Mathematics courses, is intended to provide such a foundation.

Computer Science students must complete a calculus sequence (MATH 171 and 172), a course in linear algebra (MATH 271), and a discrete mathematics course (MATH 163). They must also complete two math-based physics courses (PHYS 111-112 or PHYS 140-241), two English courses (ENGL 101 and 102) and elective courses in the humanities and social sciences. The mathematics courses are necessary because of the mathematical nature of computer science, while the physics courses will help students to deal with some of the practical aspects of the physical nature of computer design and architecture, including a foundational knowledge of electricity, magnetism, optics, and related topics affecting the design and performance of computer systems.

Other general education requirements are included for three reasons:

- their inclusion is consistent with the mission statement, philosophy and policies of the College,
- they are often required at four-year institutions for similar reasons, and
- computer scientists must be able to read, write and speak well, work with others, and have an educated understanding of the world around them, especially of the interaction between social and technological phenomena. Computers are both sophisticated calculators and sophisticated communications systems deeply embedded in modern social processes. Knowledge of human social and cultural phenomena makes students better software designers.

Revisions since Inception of Program

The program was first offered in 1986, and audited in 1991, 1995, 1999, and 2005. No major revisions to the program have been made. *CSCI 121-Discrete Structures*, was transferred to the Math Department as *MATH 163-Discrete Math* following the 1999 audit, primarily to be taught by math specialists.

Changes in pre-requisites and course content have been made periodically over the years. Most recently, there were minor revisions of all five Computer Science courses (CSCI 111, 112, 211, 212, and 213) in 2010, which included changes in courses prerequisites.

As mentioned above, the underlying principles that form the basis for the first two years of post-secondary study of Computer Science have changed relatively little since the 1980’s. The most significant changes include looking at newer processors and arrangements of internal hardware, such as memory and data communications architectures, and the move to object-oriented programming since the late 1990’s.

Currently all of our programming courses emphasize object-oriented programming using the *Java* programming language, which is very similar to the *C++* programming language and its modern derivatives, *Objective C*, used to program some Apple devices, and *Visual C++,* used in some Microsoft Programming environments. Graduates should be experts in *Java* programming, and should easily be able to adapt their skills to *C++* and its derivatives.

Curricular Innovations and Departmental Organizational Changes

The major innovations in the program have been described above, including the move to object-oriented programming and the use of newer hardware and software.

The Computer Science program has resided in the Data Processing Department, which changed its name to the Computer Studies Department, then the Computer Information Systems Department, before merging with the Office Administration Department in 2009 to become the Computer Technologies Department.

Responsibility for the program has rested with the Department Chair since the late 1990's.

The Future of Computer Science

Computer Science and Software Engineering continue to be rapidly growing high priority occupations, both locally and nationally, according to the United States Department of Labor (USDL) and the Pennsylvania Department of Labor and Industry (DLI).

According to the USDL's Occupational Outlook Handbook (OOH)[3]:

> *"…employment of computer software engineers and computer scientists is projected to increase much faster than the average for all occupations. Job prospects should be best for those with a bachelor's degree and relevant experience. … Employment of computer software engineers is expected to increase by 32 percent from 2008-2018, which is much faster than the average for all occupations. In addition, this occupation will see a large number of new jobs, with more than 295,000 created between 2008 and 2018."*

DLI lists four Standard Occupational Classification (SOC) codes for Computer Science and Software Engineering[4]:

15-1021	Computer Programmers
25-1021	Computer Science Teachers, Postsecondary
15-1031	Computer Software Engineers, Applications
15-1032	Computer Software Engineers, Systems Software

All of the above are listed as a High Priority Occupations, expected to grow "*much faster than average*" in the state by 2016. In Philadelphia, DLI projects a 42 percent increase for applications developers and a 22 percent increase for systems developers by 2016, with roughly 160 new openings annually in the City Philadelphia and three to five times that number in the surrounding counties.

Wages in the field are well above average. Again quoting from the USDL's OOH:

> "*In May 2008, median annual wages for computer applications software engineers were $85,430. The middle 50 percent earned between $67,790 and $104,870. … In May 2008, median annual wages of wage-and-salary computer*

[3] On the Web at: http://www.bls.gov/oco/ocos303.htm

[4] This table and DLI data cited herein are available from links on the Web at: http://www.portal.state.pa.us/portal/server.pt?open=514&objID=611015&mode=2

systems software engineers were $92,430. The middle 50 percent earned between $73,200 and $113,960."

In the Philadelphia, the median annual earnings for applications software developers was $83,600. For systems software developers it was $89,430.

The major directions in the field include a shift from traditional computer programming toward software engineering, and the emergence of new devices, particularly hand-held devices such as multifunctional cell phones and tablet computers.

In the past, there were two distinct groups of programmers-–junior-level programmers who could code solutions to problems, and senior-level programmers who could design solutions. They fit into three categories: systems programmers, scientific programmers, and business programmers.

Today, the opportunities for junior-level programmers, called simply computer programmers, is diminishing, while the demand for senior-level programmers, now often referred to as software engineers, is rapidly increasing. In the past, junior-level programmers could secure a job with an associate's degree or technical training. Today, employment in programming for people with less than a bachelor's degree is diminishing.

There has also been a change in the classification of programmers. Instead of being employed as systems, scientific, or business programmers, software developers are now described simply as systems programmers who build the behind-the-scenes system software such as operating systems, printer drivers, and networking software, and applications programmers who build the software that users see, such as games and office applications software.

III. Faculty

Profile of Faculty

Currently, four faculty members teach Computer Science courses within the program, Charles Herbert, Fred Goldberg, Dan Melamed, and Craig Nelson. All four are full-time faculty.

Faculty Qualifications and Expertise and Faculty Support of the Curriculum

Charles Herbert helped establish the program and has been teaching Computer Science courses at the College since the program was founded. He holds a B.S. degree in Mathematics and a B.A. degree in Education from Villanova University, and an M.S. degree in Computer Science from Saint Joseph's University. Mr. Herbert has been the author of numerous papers and conference presentations, has authored four textbooks, and contributed chapters to several others. He has served as a reviewer of papers submitted for publication to the Journal of the ACM and as a reviewer of Computer Science grant proposals for the NSF. In addition to teaching at the College, he often teaches courses and seminars at other institutions, primarily in the summers, including Villanova, Saint Joseph's University, Rutgers University and Arcadia University in the Philadelphia area; and Purdue University, Indiana University, the University of Mississippi, East Tennessee State University in the US; and Cambridge University and the University of Bologna in Europe.

Fred Goldberg has been a member of the full-time faculty since courses were first offered at the College in the 1960's and is currently the senior member of the College's faculty. He holds a B.S. in Electrical Engineering and a B.A. in Liberal Arts from the University of Pennsylvania. (At the time his degrees were granted, electrical engineering degrees were granted to students studying computing.) Mr. Goldberg has several years of experience in industry, in addition to working on computer systems at the University of Pennsylvania as a student assistant and post-graduate assistant. Mr. Goldberg previously served as Department Chair, and served as the collective bargaining unit's Secretary for more than 20 years.

Dan Melamed holds a B.S. in Computer Engineering from Spring Garden College and has been a full-time faculty member since 1998. Prior to that, he was an adjunct instructor and VL for more than 15 years. He has co-authored and presented several papers about teaching computing and teaching computer literacy. Mr. Melamed has been working as a computer programming consultant in private industry since 1991, and is a musician who has experience as a music teacher.

Craig Nelson is a graduate of Community College of Philadelphia who holds B.S. and M.S. degrees in Computer Science from Drexel University. He is currently enrolled in a doctoral program in Computer Science at Drexel University and has served as a graduate assistant at Drexel. He became a member of the full-time faculty in 2010, after many years of service as a manager of the College's Student Academic Computing Centers and the computing lab facilities that existed before their formation. He served as an adjunct faculty member teaching Computer Information Systems and Computer Science since 2005.

Mr. Goldberg and Mr. Melamed teach sections of CSCI 111 and 112. Mr. Herbert and Mr. Nelson teach those courses and CSCI 211, 212, and 213. All four instructors also teach Computer Information Systems courses.

Contributions to the Life of the College

Mr. Herbert has served the College as a department chair, curriculum coordinator, curriculum facilitator, assistant dean, grant author and administrator, and coordinator for a number of special projects. He has served on various committees, including numerous hiring committees, two Middle States Accreditation Committees, the college's Curriculum Sub-Committee, the Technology Coordinating Committee and for the past four years on the Institution-Wide Committee. He recently served as Co-Chair of the Pennsylvania Program Articulation Committee for Computer Science.

Mr. Goldberg has served as department chair, curriculum coordinator, and as a member of numerous committees throughout the College including hiring committees, several Middle States Accreditation Committees, the Business Affairs Sub-Committee, and the Institution-Wide Committee. His primary involvement has been with the Faculty Federation, which he served as Secretary for more than 25 years. He has been a member of the faculty and staff negotiating team in every round of collective bargaining since the inception of the Federation.

Mr. Melamed has served on several hiring committees within the Department, and has participated in various college-wide committees, including serving as a delegate on the Faculty Federation's Education Committee. For the past ten years, he has coordinated Credit-By-Exam for CIS 103, a course which now has more than five thousand students each year. He has served as Assistant to the Department Chair for the past several semesters and has been a contributing author for several grant proposals.

Mr. Nelson has served on numerous college committees and is currently serving as the Co-chair of the College's Technology Coordinating Committee. He also has an active record of participation in activities sponsored by Student Affairs. He recently began serving as the faculty moderator for the Student Computing Club.

Professional Development

The Department has emphasized professional development and participation in professional organizations, especially for full-time faculty. As a result, all full-time faculty in the Department have regularly participated in in-house training and in conferences sponsored by professional organizations, to further enhance their skills and knowledge in the discipline. Three of the four full-time faculty routinely attend and present papers at professional conferences, including those sponsored by the League for Innovation in the Community College, and The Community College Computing Consortium of Pennsylvania, and the ACM.

IV. Outcomes and Assessment

Graduates

The Computer Science program has averaged 6.0 graduates per year over the last six years. The fewest was 3 in 2007 and the largest is 10 this year. Two additional students are expected to complete their degree requirement in the current semester, Fall 2011.

Number of program graduates

2006	2007	2008	2009	2010	2011
5	3	6	5	7	10

Student Profile

Enrollment data drawn from the College's Institutional Research website indicates that Computer Science students are predominantly male between the ages of 22-29.

Enrollment in the Computer Science program held steady at roughly 55 to 65 students before beginning to drop in 2007. It bottomed out at 42 students in the Spring of 2009, but in the past two years it has grown back to previous levels. The credit FTE count experienced a similar phenomenon. This enrollment pattern did not match that of the College as a whole.

Credit Headcount

	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Program	**65**	**63**	**55**	**64**	**46**	**47**	**45**	**42**	**53**	**64**
College-wide	16,236	16,978	16,871	17,019	17,334	17,661	17,327	18,023	19,047	19,965

Credit FTE headcount

	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Program	**50**	**46**	**42**	**47**	**36**	**36**	**35**	**33**	**42**	**53**
College-wide	11,017	11,329	11,523	11,296	11,881	11,823	11,883	12,128	13,361	13,784

Computer Science students are predominantly male. Female student enrollment has decreased since Spring 2006, with a significantly lower percentage of female students than the College as a whole.

Program Enrollment by Gender Compared to College-wide Enrollment (percent)

Gender		Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Female	**Program**	**27.0**	**14.5**	**17.2**	**13.0**	**17.0**	**24.4**	**14.3**	**11.3**	**9.4**
	College	66.5	66.5	66.8	66.6	66.4	66.3	65.8	65.3	65.3
Male	**Program**	**69.8**	**85.5**	**82.8**	**87.0**	**83.0**	**75.6**	**85.7**	**88.7**	**90.6**
	College	32.2	32.3	32.1	32.3	32.7	32.9	33.1	33.8	33.9
Unknown	**Program**	**3.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
	College	1.2	1.2	1.1	1.1	.9	.9	1.1	.9	.8

Black students represent the largest racial/ethnic group in the Computer Science program. The program enrolls a higher percentage of Asian and American Indian students than the College as a whole. The percentage of Black and of Hispanic students is less than it was five years ago, while the percentage of Asian students has increased. The number of Black students has begun to rise again, but the number of Hispanic students remains low.

Program Enrollment by Racial/Ethnic Background

	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Amer Indian or Alaskan Native	2	2	2	1	0	1	1	1	0	1
Asian	8	2	6	8	8	7	6	6	10	13
Black, Non-Hispanic	27	30	19	27	16	15	17	13	14	20
Hispanic	5	5	5	5	6	7	5	4	2	2
Other	4	3	2	2	0	1	0	1	5	8
Unknown	3	6	6	4	3	2	2	1	6	8
White, Non-Hispanic	16	15	15	17	13	14	14	16	16	12

Program Enrollment by Racial/Ethnic Background as Compared to College-Wide Distribution (percent)

Race		Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
Amer Indian or Alaskan Native	**Program**	**3.1**	**3.2**	**3.6**	**1.6**	**0.0**	**2.1**	**2.2**	**2.4**	**0.0**	**1.6**
	College	.5	.6	.5	.4	.5	.4	.4	.4	.4	.3
Asian	**Program**	**12.3**	**3.2**	**10.9**	**12.5**	**17.4**	**14.9**	**13.3**	**14.3**	**18.9**	**20.3**
	College	7.4	7.3	7.7	8.1	8.2	7.8	7.2	7.0	6.8	6.7
Black, Non-Hispanic	**Program**	**41.5**	**47.6**	**34.5**	**42.2**	**34.8**	**31.9**	**37.8**	**31.0**	**26.4**	**31.3**
	College	46.7	47.8	46.9	47.4	46.8	47.6	46.4	46.9	46.8	47.6
Hispanic	**Program**	**7.7**	**7.9**	**9.1**	**7.8**	**13.0**	**14.9**	**11.1**	**9.5**	**3.8**	**3.1**
	College	5.9	5.8	6.1	6.2	6.5	6.4	7.0	6.6	6.9	7.2
Other	**Program**	**6.2**	**4.8**	**3.6**	**3.1**	**0.0**	**2.1**	**0.0**	**2.4**	**9.4**	**12.5**
	College	5.0	4.8	4.6	4.6	4.2	4.4	4.1	3.9	4.2	4.4
Unknown	**Program**	**4.6**	**9.5**	**10.9**	**6.3**	**6.5**	**4.3**	**4.4**	**2.4**	**11.3**	**12.5**
	College	6.1	6.5	6.8	6.9	7.8	7.9	9.0	9.9	9.9	9.7
White, Non-Hispanic	**Program**	**24.6**	**23.8**	**27.3**	**26.6**	**28.3**	**29.8**	**31.1**	**38.1**	**30.2**	**18.8**
	College	28.4	27.3	27.4	26.3	26	25.4	25.9	25.3	25.1	24.1

The majority of Computer Science students are between the ages of 22-29.

Enrollment by Age as Compared to College-wide Enrollment (Percent)

Years		Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
16-21	**Program**	**33.8**	**25.4**	**32.7**	**25.0**	**41.3**	**27.7**	**28.9**	**19.0**	**32.1**	**25.0**
	College	33.8	28.3	35.8	30.0	36.9	30.7	36.6	29.7	35.5	26.9
22-29	**Program**	**40.0**	**38.1**	**38.2**	**45.3**	**32.6**	**55.3**	**48.9**	**59.5**	**49.1**	**45.3**
	College	30.2	33.6	30.0	34.2	30.3	35.1	30.7	36.1	33.0	37.3
30-39	**Program**	**16.9**	**20.6**	**18.2**	**18.8**	**15.2**	**8.5**	**11.1**	**9.5**	**11.3**	**18.8**
	College	17.2	18.1	16.2	17.4	15.9	16.8	15.9	17.4	16.2	17.8
40+	**Program**	**6.2**	**11.1**	**7.3**	**9.4**	**6.5**	**6.4**	**8.9**	**9.5**	**3.8**	**6.3**
	College	14.6	15.6	14.2	14.9	13.8	14.6	14.3	14.6	13.7	14.0
Unknown	**Program**	**3.1**	**4.8**	**3.6**	**1.6**	**4.3**	**2.1**	**2.2**	**2.4**	**3.8**	**4.7**
	College	4.1	4.4	3.8	3.6	3.1	2.8	2.5	2.2	1.6	1.3

Generally, the ratio of full-time to part-time students has been consistently close to 50-50, with the exception of the Spring 2006 semester, when there were 65.1% part-time students and 34.9% full-time students.

Program Full-time/Part-Time Enrollments as Compared to College-wide Enrollments (Percent)

		Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
FT	**Program**	**47.7**	**34.9**	**49.1**	**46.9**	**54.3**	**51.1**	**51.1**	**54.8**	**47.2**	**50.0**
	College	31.8	30.0	33.3	29.0	32.8	29.2	32.7	30.0	35.3	32.2
PT	**Program**	**52.3**	**65.1**	**50.9**	**53.1**	**45.7**	**48.9**	**48.9**	**45.2**	**52.8**	**50.0**
	College	68.2	70.0	66.7	71.0	67.2	70.8	67.3	70.0	64.7	67.8

Retention Data

On average, 68.4% of Computer Science students enrolled in the Fall semester return to the same program the subsequent Spring semester. Fall to Spring persistence behavior is similar to that of the College as a whole, although it has spiked in the last few semesters. On the average, graduation rates in the Computer Science program are twice the college-wide rate.

Students who returned to the Same Program or a different program in the subsequent Spring Semester (Percentage)

		Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009
Returned Same Program	**Program**	**56.9**	**72.7**	**65.2**	**62.2**	**84.9**
	College	65.6	64.3	64.2	64.6	68.4
Returned Different Program	**Program**	**4.6**	**5.5**	**4.3**	**8.9**	**5.7**
	College	3.6	4.1	5.2	5.1	4.8
Graduated Fall	**Program**	**6.2**	**1.8**	**4.3**	**2.2**	**5.7**
	College	1.9	1.7	2.1	1.8	2.0
Did not return Spring	**Program**	**32.3**	**20.0**	**26.1**	**26.7**	**3.8**
	College	28.9	29.9	28.6	28.5	26.4

Students enrolled in the Computer Science program in the Fall semester either return to the same program, or do not return to the College the subsequent Fall semester. Program students are, on the average, twice as likely to graduate the subsequent Fall semester as students in the entire student body.

Students who returned to the Same Program or a different program in the subsequent Fall Semester (Percentage)

		Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009
Returned Same Program	**Program**	**36.9**	**38.2**	**37.0**	**33.3**	**50.9**
	College	36.0	36.2	35.0	37.1	38.5
Returned Different Program	**Program**	**10.8**	**12.7**	**6.5**	**8.9**	**11.3**
	College	7.2	7.5	8.2	8.5	7.6
Graduated	**Program**	**6.2**	**7.3**	**13.0**	**11.1**	**7.5**
	College	7.7	8.1	8.1	8.3	8.1
Did not return Fall	**Program**	**46.2**	**41.8**	**43.5**	**46.7**	**30.2**
	College	49.1	48.3	48.8	46.1	45.8

Academic Performance

With the exception of the Spring 2006 semester, the GPA of Computer Science students is 15 percent higher than that of the College as a whole, 25 percent higher over the past two years. Generally, students in the program complete more than 90 percent of their college-level credits attempted, more than 95 percent since the Spring of 2009.

Student success at departure has been steadily increasing in the program since the Spring of 2006, and is significantly higher than the College as a whole.

Course Completion and Average GPA

		Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009
% of college-level credits attempted/ completed	**Program**	**75.6**	**92.2**	**85.3**	**90.8**	**94.1**	**93.3**	**96.1**	**96.3**
	College	88.9	88.7	87.1	88.5	87.6	89.4	88.2	87.1
Average GPA	**Program**	**2.15**	**2.87**	**2.79**	**2.83**	**2.9**	**3.02**	**3.27**	**3.31**
	College	2.64	2.62	2.59	2.64	2.61	2.67	2.65	2.60

Academic Standing (percent)

		Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009
Good Standing	**Program**	**90.8**	**85.7**	**94.5**	**93.8**	**84.8**	**87.2**	**82.2**	**95.2**	**94.3**
	College	90.8	88.1	88.8	86.2	83.8	82.2	85	83.0	85.6
Dropped insufficient progress/ poor scholarship	**Program**	**1.5**	**4.8**	**3.6**	**1.6**	**0.0**	**4.3**	**6.6**	**2.4**	**0.0**
	College	2.6	3.8	3.0	4.3	3.4	5.5	3.7	5.7	1.2
Probation - FT/PT/ Prov.	**Program**	**7.7**	**9.5**	**1.8**	**4.7**	**15.2**	**8.5**	**11.1**	**2.4**	**5.7**
	College	6.5	8.2	8.1	9.5	12.7	12.2	11.2	11.5	13.3

Success at Departure (percent)

Status		Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008
Graduated	**Program**	**17.6**	**0.0**	**11.1**	**7.7**	**9.1**	**17.6**
	College	5.8	12.1	5.2	13.9	6.5	14.0
Long term success	**Program**	**35.3**	**41.7**	**44.4**	**53.8**	**45.5**	**52.9**
	College	38.3	38.4	35.5	35.3	33.6	35.6
Short term success	**Program**	**0.0**	**4.2**	**11.1**	**11.5**	**18.2**	**11.8**
	College	17.4	16.9	18.1	16.4	19.0	17.1
Unsuccessful	**Program**	**47.1**	**54.2**	**33.3**	**26.9**	**27.3**	**17.6**
	College	38.4	32.6	41.1	34.4	40.9	33.4

- Long term success is defined as departure with a GPA of 2.0 or greater and 12 or more cumulative hours earned
- Short Term success is defined as departure with GPA of 2.0 or greater with 11 or fewer cumulative hours earned.
- Unsuccessful is defined as all departing students not otherwise classified including students who never completed a college-level course

Program Learning Outcomes

The program level student learning outcomes have been developed and are as follows:

Upon completion of this program graduates will be able to:

1. Use technology effectively to communicate and analyze information related to computer programming, algorithm development and software engineering.
2. Work as a part of a professional team to design, code, test and debug mathematically-based, object-oriented computer software.
3. Demonstrate a fundamental knowledge of information transfer and control in modern computer systems, including knowledge of assembly languages, computer architecture and computer organization.
4. Demonstrate a basic understanding of mathematical concepts important in computer science and software engineering, including differential and integral calculus, linear algebra and discrete mathematics.
5. Develop object-oriented algorithms and data structures using the structured sequential logic of computer programming languages in an object-oriented environment and implement those solutions as Java applications and Java applets.
6. Analyze the temporal and spatial efficiency of algorithms and data structures and redesign them for increased efficiency where possible.

Course Specific Student Learning Outcomes have been developed for each course. They are as follows:

Programming and Algorithm Development I (CSCI 111)

Upon completion of this course students will be able to:

1. create computer programs using a modern high-level, object-oriented programming language.
2. work as a part of a professional team to design, code, test and debug mathematically-based, object-oriented computer software.
3. correctly use the elements of logical structure within "object-oriented software methods.
4. create source code for, compile, and execute object-oriented software that is algorithmically correct.
5. demonstrate a knowledge of input and output routines, data types, and data operations.
6. create separate "software modules that will interact one another.

Programming and Algorithm Development II (CSCI 112)

Upon completion of this course students will be able to:

1. demonstrate and understanding of the concepts of recursion and the ability to create recursive software.
2. create recursive and non-recursive object-oriented software methods to search and sort arrays of numeric and string data.
3. create object-oriented software to create and process computer graphics.
4. create object-oriented software to open, close and process object-oriented data files.
5. create software to perform simple matrix algebra on matrices stored as two-dimensional arrays of numeric data.

Data Structures and Algorithms (CSCI 211)

Upon completion of this course students will be able to:

1. define in writing each of the following data structures, and describe the advantages and disadvantages of using each, along with examples of their common specialized applications: simple linked list, circular linked list, doubly linked list, stack, queue, circular queue, heap, binary tree and B tree.
2. describe and create object-oriented recursive and non-recursive algorithms to implement, maintain, sort, and search linear data structures.
3. list the elements of a given binary tree in pre order, in order and post order formats.
4. describe and create object-oriented software to establish and maintain a balanced binary search tree using methods such as AVL trees or red-black trees.
5. implement object-oriented algorithms to establish and maintain a B tree index to records of data.
6. implement a heap of data for use in a practical application, such as in a priority queue.
7. estimate and compare the temporal and spatial complexity of algorithms for the maintenance of data structures.

Data Structures and Algorithms (CSCI 212)

Upon completion of this course students will be able to:

1. describe the theoretical architecture of a modern electronic computer.
2. describe the specific architectures of several families of microprocessors.
3. describe the assembly language of at least one family of modern computers.
4. describe the how data is stored in at least one family of modern computers.
5. Apply accepted programming techniques to assembly language software development.
6. implement assembly language code for arithmetic calculation.
7. demonstrate the proper use of first, second and third order logic structures in assembly language code.
8. implement assembly language code to handle input and output devices.
9. demonstrate the proper use of parameter passing in assembly language software with multiple program modules.

Computer Organization (CSCI 213)

Upon completion of this course students will be able to:

1. describe the binary and hexadecimal number systems including computer arithmetic,
2. describe the history and development of modern computers,
3. describe the Von Neumann computer architecture, and its strengths and weaknesses, including the Von Neumann bottleneck and how it affects machine performance
4. list and describe the functional units of a modern central processing unit
5. describe the concepts of parallel, pipelined, superscalar, /CISC and RISC computer architectures.
6. Describe the hierarchy of memory in a modern computer system and how it affects software performance.
7. List some of the outstanding problems in computer system architecture and what changes in computer architecture we are likely to see over the next several years.

Summary of Student Survey Results

Surveys were emailed or mailed to 55 current students, 61 graduates, and 160 former students of the Computer Science program. Responses were received from 25 current students, 3 graduates, and 1 former student. The complete survey results are shown in Appendix B.

Results show that a large majority of students are/were satisfied with the program. Of the current students who responded to the surveys, 84% said that they are satisfied with the instruction they are receiving. The three program graduates who responded said that they were satisfied with the instruction they received.

Likewise, many students are/were satisfied with the support they received from program faculty. Of the current students who responded, 84% said they were satisfied while two of the three graduates said they were satisfied with the support they received from program faculty.

Many current students detailed how the professors were very helpful in class. They also noted that they were given plentiful advice about transferring. In response to the question, ***"Do you feel that you are accomplishing/have accomplished the educational objectives you set for yourself at Community College of Philadelphia"***, all current students and program graduates said that they either fully or partly accomplished their educational objectives.

All program graduates transferred to another institution after graduation from CCP. When asked, ***"How well did the Computer Science Program prepare you for the academic demands at the college to which you transferred,"*** one program graduate indicated that preparation was good, and the other two indicated that preparation was fair. The 3 program graduates who responded mentioned that had the programming aspect of the curriculum been better, they would have felt more prepared at their transfer institution.

Current students responded to the question, ***"How well is the CCP Computer Science Program preparing you for transferring to another college?"*** While 36% and 48% said that preparation was excellent and good, respectively, 12% and 4% said that preparation was fair or not helpful. Students cited the same issue with the programming aspect of the curriculum.

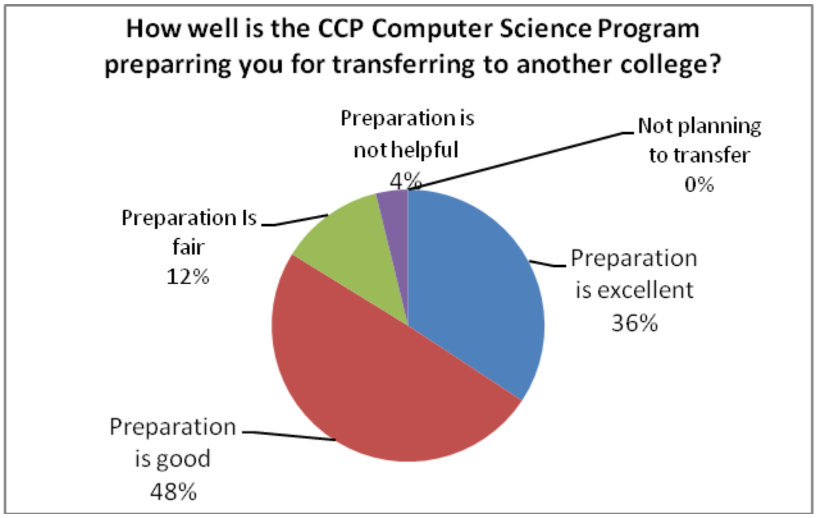

Figure 3

Survey respondents cited a variety of strengths of the Computer Science program. The following is a sample of responses:

- In learning the basic and general knowledge, the basic knowledge prepares you to adapt between programming languages. Since every couple of years, there is a new language you have to learn to keep with the market. The general knowledge is base (sp) on the components that you can program to provide a business solution, such as three-tier architecture: Presentation, Logic, and data.
- As explained before, it gives you the basic tools for a better reasoning when challenged by a problem.
- "ThE pRogRAMMiNg class (sp) ARE gREAT"
- "Hands on programming projects"
- "GOOD CHOICES ABOUT PROGRAMMING LANGUAGES LIKE JAVA AND ASSEMBLY"
- "A lot of fundamental programming practice."
- "The peers and faculty".
- "The entire department is open to ideas and have office hours."
- "Good teachers"
- "Flexible class times, small group, more one on one help and getting the help you need."
- "The professors within the curriculum. They are highly educated and extremely helpful."
- "It helps me work the programming portions when I'm in computer-related classes".

In response to the question ***"What do you feel needs to be changed or added to the Computer Science program in order to improve the program?"***, students cited that they felt that the programming work was too easy. Samples of responses are as follows:

- Use updated programming technology about the architecture client-server model and teach on how to use different data backend software, like SQL, MySQL, ORACLE, ETC.
- CCP need to have harder lab assignment especially data structure class. CCP need to have C programming course.

- My teachers were great, the material was great and well explained, but the programming homework can be a little more challenging, not to make the program difficult, just so the student comes with stringer skills into the next institution.

Graduates of the program responded to the question ***"What courses or topic could have been added to the Computer Science Program curriculum that would have been more useful to you in performing your current job?"*** with the following suggestions:

- Database management
- Web application

There was one former student who responded to the survey. A sample of the questions and responses can be found below:

In response to the question *"**Which of the following reasons were important to you when you enrolled in the Computer Science Program at CCP?"*** the former student made the comment:

- "To meet the prerequisites to get into a graduate program in Drexel's software engineering master after receiving my undergraduate degree at Arcadia University in History."

When asked the question, ***"What do you think are the strengths of the Computer Science Program?***, the former student made the following comment:

- "I think that CCP has many competent teachers in their Cis/CS department. Competent teachers make it easier for students to learn a hard subject."

Finally, in response to the question, ***"What do you think needs to be changed or added to the Computer Science Program in order to improve the program?"*** the former student wrote:

- "I would have liked to have been able to take more advanced Computer Science class's (sp) than what was offered. Also class's (sp) should be recorded so that a lecture can be revisited by a student. This would also allow for a (sp) online class at the same time."

V. Resources

The current classroom space, offices and other general facilities used for the program are adequate to meet the needs of the program and its students. Given the technical nature of the program, special attention needs to be paid to the computer hardware and software needs of the program.

Currently in Use

Standard modern personal computer systems are generally sufficient to run the software used for Computer Science courses and no specialized hardware is currently used for the program, except for demonstrations using equipment that is owned by faculty members, such as Apple computers and various cell phones and tablets. As a result, Computer Science courses can be taught using the computerized classroom in which *CIS 103-Applied Computer Technology* is taught. Since CIS 103 is a course with over 70 sections each semester, Computer Science courses can be taught in almost any computerized classroom in the College without the need for special hardware accommodations.

The software used in the program includes:

- **Android Software Development Kit (SDK)**
- **Apache Tomcat**
- **Eclipse IDE for Java**
- **Java Development Kit 7 (JDK 7)**
- **Java NetBeans Integrated Development Environment (IDE)**
- **Java Runtime Environment (JRE)**
- **JUnit – Unit Testing Framework**
- **Microsoft Macro Assembler (SDK)**
- **Microsoft Office**
- **Microsoft Visio**
- **MySQL Server**
- **Note Pad ++**
- **Open Source Software**
- **Oracle Express Server**

Microsoft and Oracle software Visio are available under departmental and college-wide purchasing agreements and are used in other courses and programs in the College as well.

All of the other software listed is available as open-source software under GNU licenses or similar licenses.

A more detailed description of the program's use of the listed software is included as Appendix C in this document.

Additional Needs of the Program

The current hardware and software for the program has been adequate because faculty members have been using their personal property to conduct demonstrations in the course. They have done so willingly, and have not requested demonstration equipment. However, as topics such as gaming and mobile application development become more important, especially if individual courses in these areas are to be offered within the program, The College should acquire such equipment. Development for gaming and mobile platforms happens on standard personal computers, so no new computer labs are needed, but sample equipment should be acquired for demonstrations and so the students can test and display their work on the devices for which the software was written.

Computer Science programs in four-year institutions offer a variety of tracks for students to pursue, with Gaming, Applications Software Engineering, Mobile Application Development and Human Computer Interaction (HCI) among the most popular. As suggested elsewhere in this document, the curriculum should be modified to match the new state-wide standards, which allow for choosing one of these courses as an elective in the second year of the program. When new courses in gaming and mobile applications development are made available to students as elective courses, then the College should acquire the demonstration hardware for those courses. The estimated cost for this should be in the range of one thousand to three thousand dollars per year. The demonstration equipment would be used in CSCI 111, 112, and 211.

VI. Demand and Need for the Program

Computer Science

Computer Scientists solve complex business, scientific, and general computing problems by creating new technology. Often times, Computer Scientists work with electrical engineers, mechanical engineers, and other specialists. In the Occupational Outlook Handbook published by the United States Department of Labor's Bureau of Labor Statistics, "Employment of computer scientists is expected to grow by 24 percent from 2008 to 2018, which is much faster than the average for all occupations. Employment of these computer specialists is expected to grow as individuals and organizations continue to demand increasingly sophisticated technologies." High skilled workers, such as those who graduate from a Ph.D. program are in high demand. As we advance technologically, so will the demand for computer scientists knowledgeable in fields such as networking technology, computing speeds, software performance, embedded systems, and information security. [5]

In Pennsylvania, Computer Science careers are among the highest in expected growth between 2004 and 2014. In particular, Network Systems Analysts can expect the highest growth rate of 46.5% between 2004 and 2014 followed closely by Applications Software Engineers and Systems Software Engineers with growth rates 43.1% and 35.4%, respectively. The "hot jobs" identified by Pennsylvania Work Statistics were mostly computer-related jobs. [6]

Three careers for which a background in Computer Science is useful are among the 22 "Hot Jobs in Philadelphia" for 2010[7], and are projected to see double-digit job growth over the next five years. These jobs and their estimated growth rate are:

	Estimated Percent Growth 2010-2015
Computer Applications Software Engineers	15%
Computer Systems Analysts	18%
Network Systems and Data Communications Analysts	28%

[5] http://www.bls.gov/oco/ocos304.htm
[6] http://www.paworkstats.state.pa.us/project/college_degree.pdf
[7] http://www.pwib.org/downloads/Hot%20Jobs%20in%202010%20Report_April.pdf

VII. Operating Costs and Efficiency

Credit Hours Produced and Cost per Credit Hour

	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010
Program Courses					
Credit hours produced	14,547	14,505	15,532	15,297	18,516
Cost per credit hour	$119.31	$127.19	$120.77	$124.68	$117.33
College-Wide Average					
Credit hours produced	339,439	338,545	348,808	348,969	388,581
Cost per credit hour	$129.79	$137.13	$144.42	$144.65	$138.33

Annual Total Program Costs Per FTE

	2005-2006	2006-007	2007-2008	2008-2009	2009-2010
Program	$6,647.13	$6,997.40	$7,565.73	$7,324.94	$7,087.57
College-wide Average	$6,666.82	$7,019.64	$7,486.11	$7,343.31	$7,190.51

Source: Office of Finance and Planning: Table 30

	Program 2007-2008	College-Wide Average 2007-2008	Program 2008-2009	College-Wide Average 2008-2009	Program 2009-2010	College-Wide Average 2009-2010
# FTE	41.5	13,941	39.1	14,207.50	55.6	15,808.7
Total Operating Cost					$394,069	$113,672,550
Direct Instr'l Cost*			$138,203	$50,476,857	$183,326	$53,751,446
Indirect Cost					$210,743	$59,921,104
Indirect Cost per FTE		$3,494.94				
Direct Cost per FTE	$3,549.20	$3,494.96	$3,534.60	$3,552.83	$3,295.75	$3,400.11

Total Operating, Average Direct and Indirect Costs FY 2007-08 and 2008-2009
* Direct Costs include all expenses associated with the instructional cost centers, including the allocation of fringe benefits.
Source: Office of Finance and Planning: Table 29

VIII. Findings and Recommendations

The Computer Science program has had a long history at the College. Over the years, it has been associated with various industry leaders in the field of computer science, from the Association for Computing Machinery, the Institute of Electrical and Electronic Engineers, to the Computer

Science Advisory Board. The program is currently advised, in part, by an advisory committee that is overarching in its duties, as it is an entity that advises all of the Computer Technologies programs at the College. The advisory committee is diverse in its composition, as it has members from area businesses, schools, and industries such as CISCO, Drexel, Temple, University of Pennsylvania, the United States Department of Labor and The City of Philadelphia.

The current students indicated that they were satisfied with the program and with the level of instruction they received. Based on student responses to surveys, the program is somewhat beneficial in terms of preparing students for transfer to other institutions of higher education.

With only 3 responses, it is difficult to draw conclusions about program graduates

The program's students tend to fair well academically, as their average GPAs have been higher than the College's for 8 of 9 semesters. Additionally, students in the program are more likely than not to be successful upon departure from the College. However, the program is small. With regard to program enrollment by age, the program enrolls more 22-29 year old students, than the College as whole. The program has also consistently enrolled fewer females over time. Moreover, there has been an average of 6 graduates in the Computer Science program in the last six years

In light of the fact that the computer science field is expected to experience growth much faster than other fields, as indicated by data from the Bureau of Labor Statistics, and the program's expressed purpose of "…mirror[ing] the first two years of a four-year computer science curricula", the following recommendations are being made:

Recommendation 1: Align the program with the Pennsylvania Department of Education's curriculum guidelines for Computer Science established in 2011 by the Transfer and Articulation Oversight Committee (TAOC). Update the program's curriculum following the guidelines and standards associated with the Computer Science Advisory Board (CSAB)[8].

Timeline: Spring 2012

Recommendation 2: Explore program accreditation as an option to keep the program up-to-date with the latest industry standards and to ensure that the program consistently mirrors the first two years of a baccalaureate program.

Timeline: 2012-2013

Recommendation 3: Create a sub-committee of the over-arching Computer Technologies Advisory Committee to address only the curricular, resources, and other program concerns of the Computer Science program.

Timeline: Spring 2013

[8] For more information on the CSAB see: www.csab.org

Recommendation 4: Designate a specific faculty member to be responsible for supervision of the program. That person should be responsible for implementing the goals of the program.

Timeline: 2012-2013

Recommendation 5: Develop and implement a comprehensive enrollment management plan that includes an assessment of current and past efforts, effectiveness, and new recruitment strategies. The plan should aim to increase program enrollment of:

a. Traditional-Aged College Students
Consider partnership with the School District of Philadelphia and outreach organizations that address transition-to-college initiatives.

b. Female Students
Consider STEM initiatives (especially gender specific initiatives) on and off-campus.

c. Internal Students
Consider students who may be unsure of their major but who have excellent skills in computer science, or students who may be shadowing the program but have a different program major.

Timeline: Begin Fall 2012

Recommendation 6: Increase emphasis on securing computer science specific articulation agreements with area schools and universities that have 4-year computer science degree programs. Securing articulation agreements that are specific to computer science would help to ensure that the graduates of this program have additional options in terms of seamless pathways from the College to a baccalaureate degree granting institution.

Timeline: Begin Fall 2012

Recommendation 7: Using authentic assessment, continue to refine and implement the outcomes assessment plan at the program and course levels to ensure excellence in student learning and academic success. The goal is to complete assessment of all student learning outcomes within five years with 20% of the course student learning outcomes completed each year.

Timeline: Spring 2012

Recommendation 8: Develop a detailed Technology Plan with Academic Computing to monitor and assess the hardware and software needs of the program to ensure that the technology used for courses is current. The plan should consider acquisition of hand-held devices and gaming consoles for use in class for computer science students to have practical experiences with developing applications for these devices.

Timeline: Spring 2012

APPENDICES

Appendix A: Computer Technologies Advisory Board

COMPUTER TECHNOLOGIES DEPARTMENT

ADVISORY COMMITTEE
Fall 2011-Spring 2014 Appointments

Jody Bauer, Chief Information Officer
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f - 610-271-9178
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Mr. Robert Gallagher
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Mr. James Gist, Information Technology, CTE
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Division of Career and Technical Education
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Fax: (215) 400-4232
Email: jgist@philasd.org

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Mr. Robert E. Minor III, Deputy CIO of Infrastructure
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Mr. Lester "Skip" Shuda, CEO
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Updated April 8, 2011

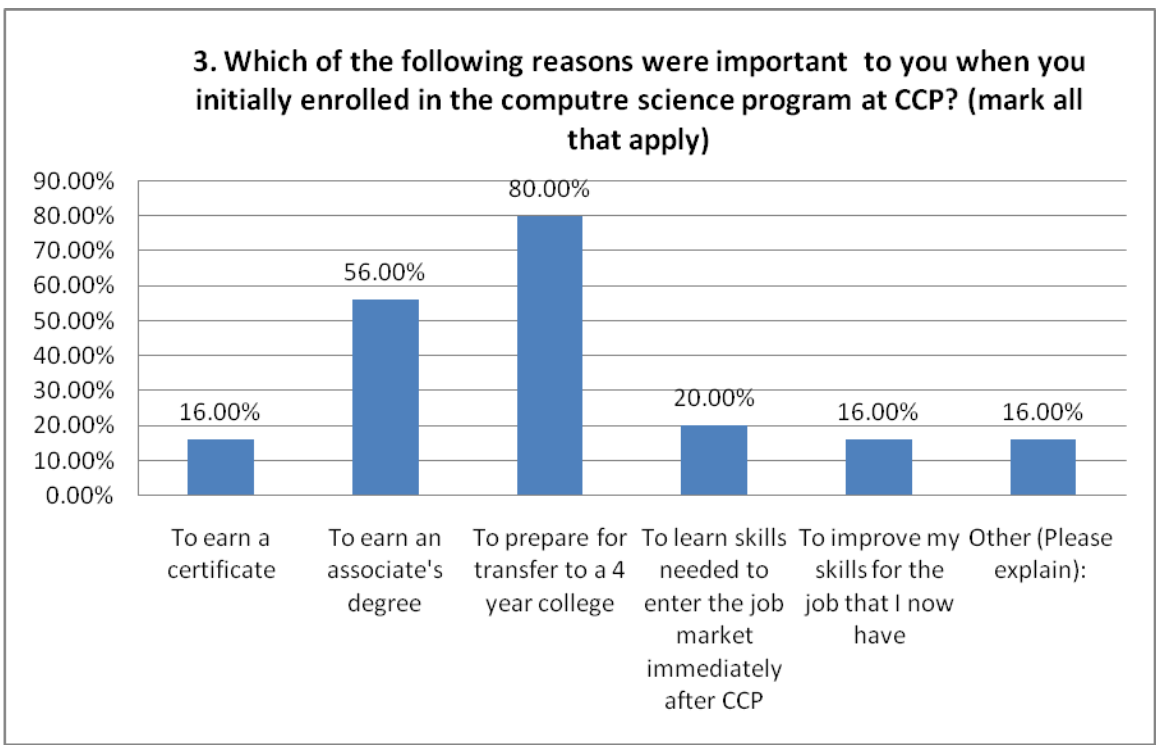
Appendix B: Student Survey Results

Survey Results – Current Students
N = 25

1. When did you enter the Computer Science Program?								
Fall 2006	Fall 2008	Fall 2009	2009	Spring 2010	Fall 2010	Fall 2011	2011	Spring 2011
1	2	1	1	2	7	5	1	5

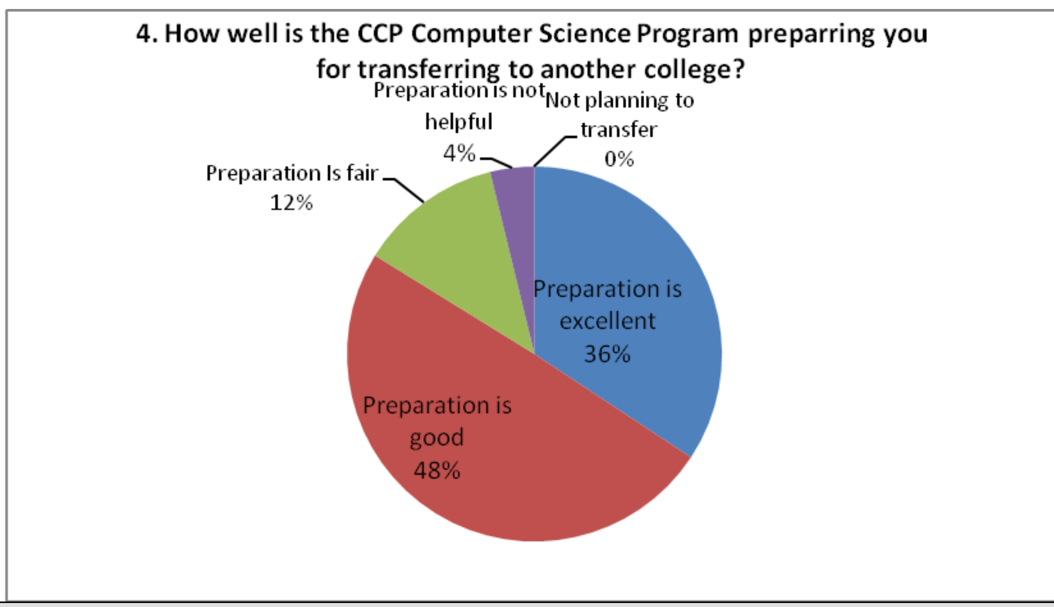
2. Are you currently attending CCP full-time or part-time?		
Answer Options	Response Percent	Response Count
Full-time	60%	15
Part-time	40%	10

3. Which of the following reasons were important to you when you enrolled in the Computer Science Program at CCP? (Mark all that apply)		
Answer Options	Response Percent	Response Count
To earn a certificate	16.0%	4
To earn an Associate degree	56.0%	14
To prepare for transfer to a four year college	80.0%	20
To learn skills needed to enter the job market immediately after CCP	20.0%	5
To improve my skills for the job that I now have	16.0%	4
Other (please explain)	16.0%	4



4. How well is the CCP Computer Science Program preparing you for transferring to another college?		
Answer Options	Response Percent	Response Count
Preparation is excellent	36.0%	9
Preparation is good	52.0%	13
Preparation is fair	12.0%	3
Preparation is not helpful	4.0%	1
Not planning to transfer	0.0%	0
Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.		

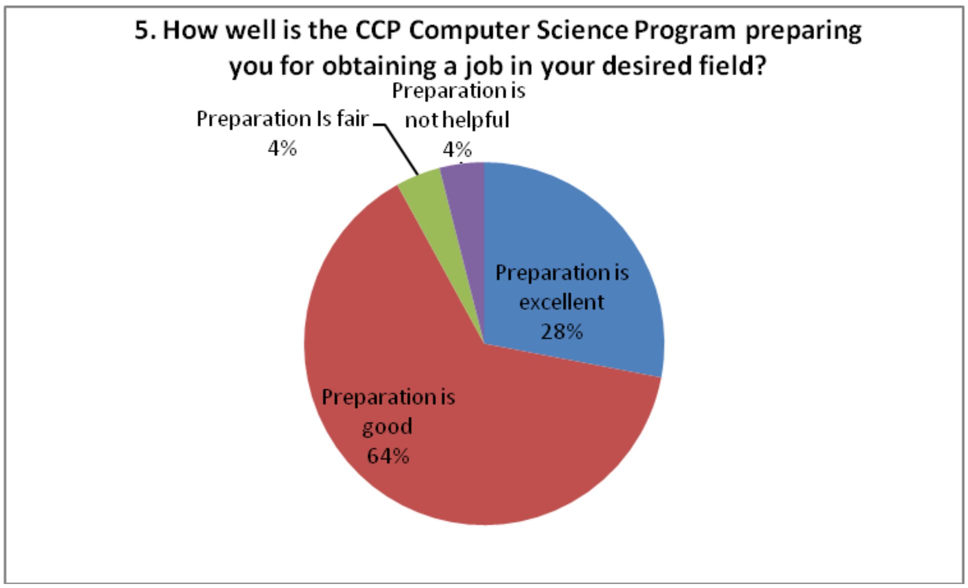
Number	Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.
1	Until now, we learned to programming in java but we did not learn other programming.
2	Java and netbus are great tools to understand how things work; instead of just using tools available.
3	The teachers teach us very good
4	It has prepared me well, however I would like guest lecturers from professors from Drexel.
5	The teachers are doing a good job.
6	I made a poor decision by coming to CCP. It is very difficult to transfer into top schools from here. Even with a 4.0.
7	He’s a great teacher.



5. How well is the CCP Computer Science Program preparing you for obtaining a job in your desired field?		
Answer Options	Response Percent	Response Count
Preparation is excellent	28.0%	7
Preparation is good	64.0%	16
Preparation is fair	4.0%	1
Preparation is not helpful	4.0%	1

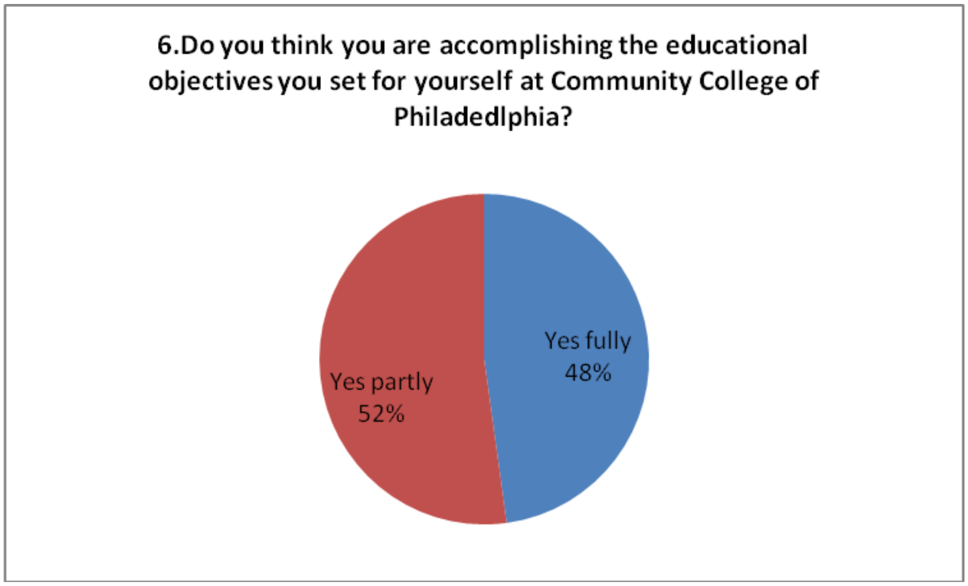
Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.	3

Number	Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.
1	Again Professor Herbert relates work done in class to real work in the field constantly which is very important for the students.
2	I feel that the preparation offered through the CCP Computer Science Program is not quite adequate for obtaining a job in my desired field, especially when considering today's extremely competitive job market. The major reason for this is, again, because a lot of instructors don't really care whether their students can understand what they're talking about or not. Plus, a less major reason is that I feel the Computer Science courses are still too basic and simple to be of any direct use for obtaining and maintaining a job in my desired field.
3	Again Professor Herbert relates work done in class to real work in the field constantly which is very important for the students.



6. Do you think you are accomplishing the educational objectives that you set for yourself at Community College of Philadelphia?		
Answer Options	Response Percent	Response Count
Yes, fully	44.0%	11
Yes, partly	48.0%	12
No	0.0%	0
Please comment		

Number	Please comment
1	I wish I was guided towards a program that focused more on Networking when I asked for help from the advisers.
2	That part of the reason, again, is because of poor instructions being received from poor-quality instructors.



7. What do you think are the strengths of the Computer Science Program?	
Number	Response Text
1	Good teachers
2	Good
3	The entire department is open to ideas and have offices hours.
4	Good choices about programming languages like java and assembly
5	The peers and faculty.
6	A lot of fundamental programming practice.
7	None bad
8	Hands on programming projects
9	The programming class are great.
10	No classes during the summer semesters.
11	It's alright.
12	Its helps me work on the programming portions when I'm in computer-related class.
13	The professors within the curriculum. They are highly educated and extremely helpful.
14	Flexible class times, small group, more one on one help and getting the help you need.

8. What do you think needs to be changed or added to the Computer Science Program in order to improve the program?	
Number	Response Text
1	All teachers need to follow the same guidelines and there needs to be more resources for students, the assignments cannot always be done just using the book.
2	A uniform teaching on the subjects between teachers.
3	Need more available classes during all semesters (right now only a few classes are available during one or the other semester.
4	Networking
5	I don't think there is anything that needs to be changed as of now.
6	Make CSCI 211 available for the spring semester.

7	Seriousness, rigor, proffessors.
8	A mobile App course, assembly language needs to be taught on campus and with better real world applications i.e. games, calculators, pro games.
9	Wish it could be a four years degree
10	More courses
11	Introduce java script with java programming
12	More course should be offered in this year.
13	Tutoring
14	A little other programming knowledge.
15	Programming courses in mobile technology.
16	Offer classes at other campuses.

9. Are you satisfied with the instruction you are receiving?		
Answer Options	Response Percent	Response Count
Yes	92.0%	23
No	4.00%	1

9a. If no, why not?	
Number	Response Text
1	Again, because of poor-quality instructors.

10. Are you satisfied with the support you are receiving from the program faculty?		
Answer Options	Response Percent	Response Count
Yes	84.00%	21
No	4.00%	1

10a. If yes, please give an example of the type of support you are receiving.	
Number	Response Text
1	Dr Herbert was very instrumental in telling my class what colleges in the area we could apply to and he also let us know additional classes that were not included in the curriculum that we take.
2	Any questions are always answered.
3	Professor Herbert is always willing to help you as busy as he is.
4	Plenty of time given in lab, the teacher will sit with you until the problem is resolved, and the CBI SACC is generally readily available.
5	reference letter
6	Advice as to which classes are best suited for me to maximize my transfer credits
7	perfect follow up with home work.
8	Advice on transferring after CCP and more knowledge about the current technology.
9	Answering questions, providing software, etc.

11. What is your current job title and what type of work you do in your primary job?	
Number	Response Text
1	Tutor I tutor high school kids in Math
2	Residential Counselor
3	COMpuTeR Lab MONITOR ANSWER bASIC qUESTIONS AbOUT COMMOn COMPUTER ApplicATION USEd by

	STUDENTS And ARE RESpONSiblE FOR hElpiNG MAINTAIN thE COMpUTER lAb.
4	Accounting
5	No Job
6	Preparation cashier
7	Senior Web Developer Web development-PHP, HTML, CSS, Java Script
8	Sale support
9	Subway Operator
10	Driver Driver
11	Job Not Related to Computer Science but would like a job in my field

12. Is this job directly related to the field of Computer Science?		
Answer Options	Response Percent	Response Count
Yes	8.00%	2
No	28.00%	7

13. Was your enrollment in the Computer Science Program helpful to you in getting this job?		
Answer Options	Response Percent	Response Count
Yes	4.00%	1
No	32.00%	8

14. Were you employed in this job prior to enrolling in the Computer Science Program at CCP?		
Answer Options	Response Percent	Response Count
Yes	24.00%	6
No	12.00%	3

15. If yes, have your experiences in the Computer Science Program at CCP helped you do your job better?		
Answer Options	Response Percent	Response Count
Yes	4.0%	1
No	24.0%	6

16. How could your Community College of Philadelphia education be more useful to you in performing your job?	
Number	Response Text
1	Helps me with better logic and to better explain concepts to students.
2	LEARN MORE AbOUT MobilE TEchNology
3	Professors with more passion, but more importantly more knowledge.

17. How many hours per week on average do you work in this job?	
Number	Response Text
1	20
2	20
3	32
4	40
5	15-20
6	40
7	48
8	25
9	20
10	27

18. If you are not employed now, is this employment status by your choice?		
Answer Options	Response Percent	Response Count
Yes	62.5%	5
No	37.5%	3
	• to much work for the major and both a job . you can only do one or the other.	

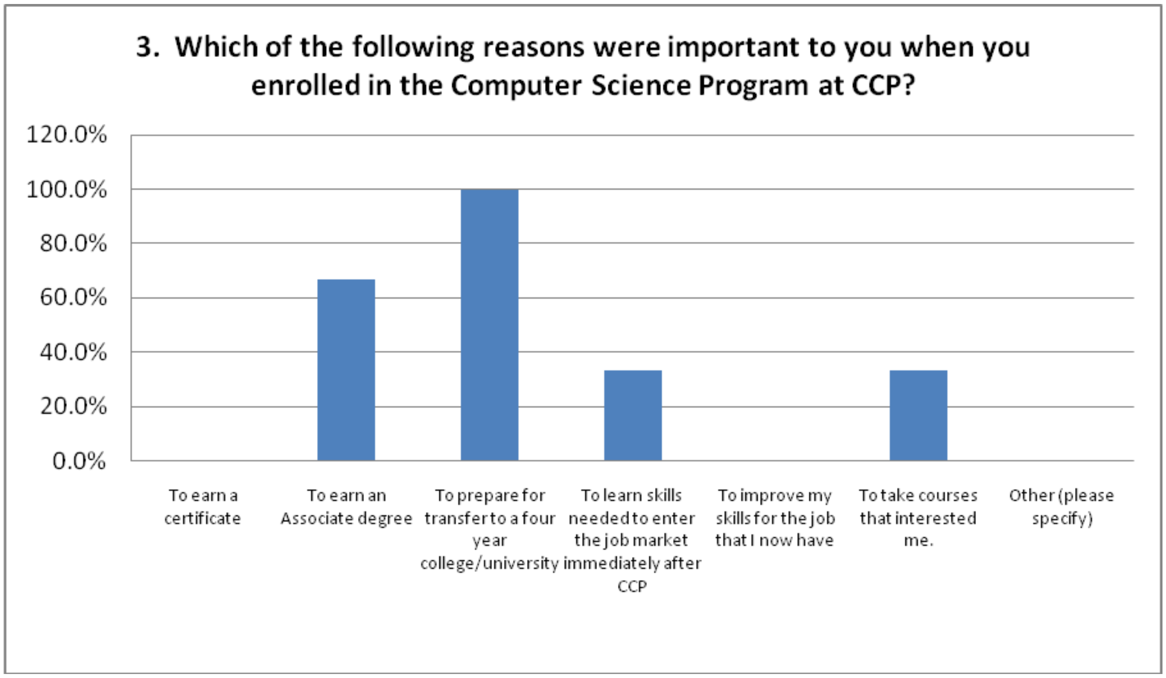
Survey Results – Program Graduates
N = 3

1. When did you enter the Computer science Program?	
Fall 1995	Spring 2006
1	1

2. When did you graduate from the Computer Science Program?		
Spring 1997	Summer 2008	2008
1	1	1

3. Which of the following reasons were important to you when you enrolled in the Computer Science Program at CCP? (Mark all that apply)		
Answer Options	Response Percent	Response Count

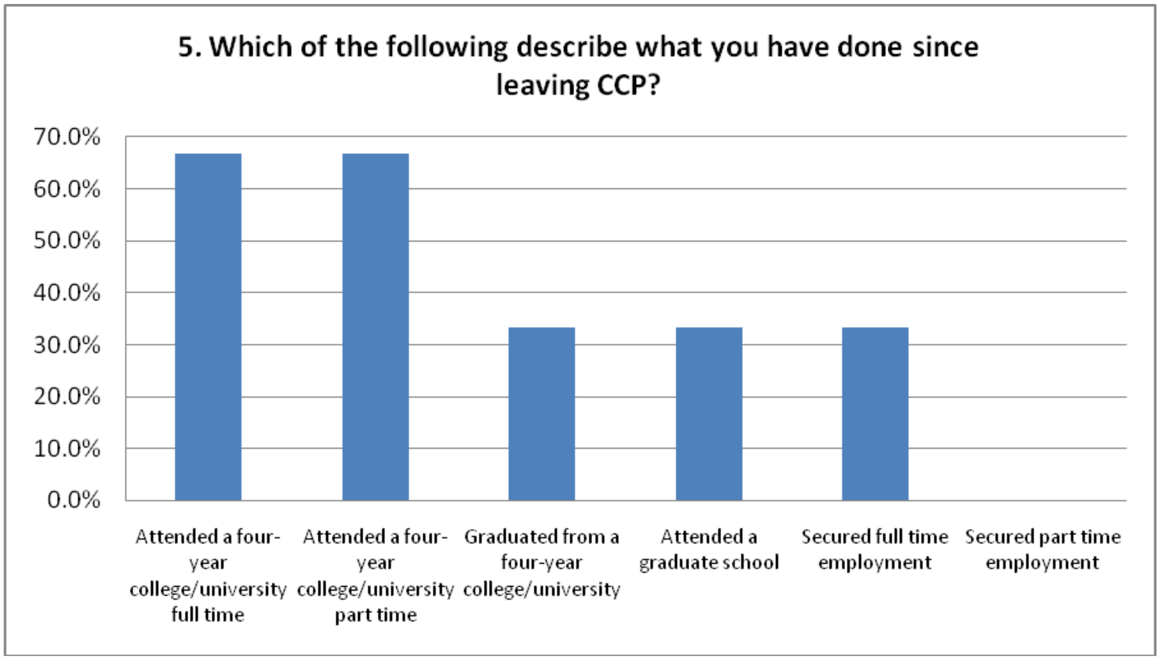
To earn a certificate	0.0%	0
To earn an Associate degree	66.7%	2
To prepare for transfer to a four year college/university	100.0%	3
To learn skills needed to enter the job market immediately after CCP	33.3%	1
To improve my skills for the job that I now have	0.0%	0
To take courses that interested me.	33.3%	1
Other (please specify)	0.0%	0



4. Did you accomplish the educational objectives that you set for yourself at Community College of Philadelphia?		
Answer Options	Response Percent	Response Count
Yes, fully	66.7%	2
Yes, partly	33.3%	1
No	0.0%	0

5. Which of the following describe what you have done since leaving CCP? (Mark all that apply)		
Answer Options	Response Percent	Response Count
Attended a four-year college/university full time	66.7%	2
Attended a four-year college/university part time	66.7%	2
Graduated from a four-year college/university	33.3%	1
Attended a graduate school	33.3%	1
Secured full time employment	33.3%	1
Secured part time employment	0.0%	0
Other	33.3%	1

Number	Please comment.
1	I am graduating this Fall 2010 (Temple University)



6. Name of most recently attended college, date started, and major:	
Number	**Response Text**
1	Temple University
2	Temple University, Fall 2008, Computer Science
3	Temple University, Fall 2009, Computer Science

7. Present enrollment status at the college listed in Question 6		
Answer Options	**Response Percent**	**Response Count**
Still attending full time	0.0%	0
Still attending part time	33.3%	1
Stopped attending before graduating	0.0%	0
Graduated	66.7%	2
If graduated, what is your degree and date of graduation?		2

Number	If graduated, what is your degree and date of graduation?
1	Master of Science in Computer Science and Information Technology 2001
2	Graduating this December 2010

8. If you transferred to another college, how well did the Computer Science Program prepare for the academic demands at the college to which you transferred?		
Answer Options	**Response Percent**	**Response Count**
Preparation was excellent	0.0%	0
Preparation was good	33.3%	1

Preparation was fair	66.7%	2
Preparation was not helpful	0.0%	0
Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.		3

Number	Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.
1	I learn the basic knowledge of programming, which was a good foundation for my career; however the problem that I see is that the materials teach on the period that I was in CCP was not updated with the latest technology used in the market. I am not sure what technology are you teaching now but If I was a current student in your program, I will like to be used programming languages that are at least 3 years old. When I was in CCP, I was learning programming using Pascal language. This language was not longer used or they were few jobs in the marker with this requirement.
2	At CCP there is no C programming class, so when transferred to Temple, I was struggle with the operating system class
3	The Computer Science program at CCP is good, it gives you the basic tools you need and it allows you to think critically and apply logic. The only thing I would recommend is that the programming part be a little more challenging. I say this because it is not that easy at the institution I'm in now.

9. Were you satisfied with the instruction you received in the Computer Science program?

Answer Options	Response Percent	Response Count
Yes	100.0%	3
No	0.0%	0

10. Were you satisfied with the support you received from the program faculty?

Answer Options	Response Percent	Response Count
Yes	66.7%	2
No	33.3%	1

10a. If yes, please give an example of the type of support you received.

Number	Response Text
1	CCP was very affordable
2	The teachers were very helpful and explained the material in a way that was easy for the students to understand

10b. If no, what type of support were you looking for and did not receive?

Number	Response Text
1	Even that I had a good teacher, I think that I need more support in the labs assigments

11. What do you feel are the strengths of the Computer Science Program?

Number	Response Text
1	In learning the basic and general knowledge, the basic knowledge prepares you to adapt between programming languages. Since every couple of years, there is a new language you have to learn to keep with the market. The general knowledge is base on the components that you can program to provide a business solution, such as three-tier architecture: Presentation, Logic, and data.
2	Honestly, I think CCP Computer Science was very weak compared to Temple University

3	As explained before, it gives you the basic tools for a better reasoning when challenged by a problem.

12. What do you feel needs to be changed or added to the Computer Science Program in order to improve the program?	
Number	**Response Text**
1	Use updated programming technology, teach about the architecture client-server model and teach on how to use different data backend software, like SQL SERVER, MySQL ORACLE, ETC.
2	CCP need to have harder lab assignment especially data structure class. CCP need to have C programming course.
3	My teachers were great, the material was great and well explained, but the programming homework can be a little more challenging, not to make the program difficult, just so the student comes with stronger skills into the next institution.

13. If you transferred to another college or university, did your transfer institution accept your Computer Science courses?		
Answer Options	**Response Percent**	**Response Count**
Yes, all of them	100.0%	3
Yes, some of them	0.0%	0
None of them	0.0%	0
Please list the courses that did not transfer		0

14. If you transferred to another college/university, did your transfer institution accept your non-Computer Science courses?		
Answer Options	**Response Percent**	**Response Count**
Yes, all of them	66.7%	2
Yes, some of them	33.3%	1
None of them	0.0%	0
Please list the courses that did not transfer		0

15. What is your current job title and what type of work you do in your primary job?	
Number	**Response Text**
1	Title: Senior Officer of Process Analysis Description • Manage and implement technical solutions to improve business process. • Interact with program staff and senior management to address Ad hoc data requests • Act as technical liaison between the Program and Research Data departments in Transition Workforce Development • Manage and mentor a team of software developers. • Managed projects and ensured tasks completion in a timely manner. • Analyze, define, and document requirements, design and develop detailed interfaces and functionality, architect and implement technical solutions from hardware and software. • Develop web base applications and automated process using languages such as java script, XML, VB.NET, ASP.NET, C-Sharp, and T-SQL. Use developing tools such as Microsoft Visual Studio, SQL Server Management Studio and data management tools such as Data Transformation Services (DTS) and SQL Server Integration Services (SSIS). • Applications develop to integrate and migrate data from multiple database system from internal and external partners, Identify discrepancies base on the business rules and data entry, Fiscal payment, Business Performance, and email reporting distribution. • Develop custom data views and reports in Crystal Reports and MS Reporting Services.

	• Administration and setup of the Kronos web base application, Kronos data collection system and SQL server. • Maintain SQL database including performance tuning. Perform disaster recovery including all software installations, network, and system settings. • Resolve any systems failure, including hardware and software malfunctions. • Coordinated with the Technical Support Specialist, all activities related to technical training users. Provide 2nd tier user support. • Development and plan documentation for hardware and software upgrade.
2	Student Career Program – Oversee and maintain database (Database administrator)

16. Is this job directly related to the field of Computer Science?		
Answer Options	Response Percent	Response Count
Yes	100.0%	2
No	0.0%	0

17. Was your enrollment in the Computer Science Program helpful to you in getting this job?		
Answer Options	Response Percent	Response Count
Yes	100.0%	2
No	0.0%	0

18. Were you employed in this job prior to enrolling in the Computer Science Program at CCP?		
Answer Options	Response Percent	Response Count
Yes	0.0%	0
No	100.0%	2

18a, If no, how well did the Computer Science program prepare you for your job?		
Answer Options	Response Percent	Response Count
Preparation was excellent	0.0%	0
Preparation was good	50.0%	1
Preparation was fair	50.0%	1
Preparation was not helpful	0.0%	0
Please explain. We would appreciate your comments on your Computer Science courses as well as your other general education courses.		0

19. What courses or topic could have been added to the Computer Science curriculum that would have been more useful to you in performing your current job?	
Number	Response Text
1	Database management, web application

20. How many hours per week on average do you work in this job?	
Number	Response Text
1	50 hours
2	20 hours

21. If you are not employed now, is this employment status by your choice?		
Answer Options	Response Percent	Response Count
Yes	0.0%	0
No	100.0%	1

Appendix C: Software Used in Computer Science Courses

MICROSOFT VISIO
In CSCI 111 students are exposed to concepts and skills in Data Modeling and Process Modeling. Data modeling is demonstrated and assessed through the use of Unified Modeling Language (UML) Class Diagrams. Process modeling is demonstrated through using Flow Chart Diagrams. Microsoft Visio is currently one of the leading choice tools in industry for these activities. Students are encouraged to gain a moderate level of proficiency using Visio. Adapting Microsoft Word as a modeling tool is also illustrated for modeling assignments that are less sophisticated.

In CSCI 112 Data Modeling and Process Modeling with MS Visio is continued with emphasis moving towards creating Abstract Data Types and Understanding Entity Relationship (ER) Diagrams. Additionally, Visio is used to demonstrate and encourage developing wireframe diagrams for designing interface's and understanding Human Computer Interactions (HCI).
Finally in CSCI 211 Data Modeling and Process modeling are used to convey the frameworks of complex data structures such as: Linked lists, Binary Trees, Spanning Trees. Emphasis is still placed on constructing Flow Chart, and ADT using Class Diagrams.
Currently students are able to obtain this software free of charge through our association with Microsoft's MSDN program.

Microsoft Office
All Computer Science Courses: CSCI 111, CSCI 112, CSCI 211, CSCI 212, and CSCI 213 require students to create several technical documents in association with application and project submissions. It is encouraged that students use a professional document editing environment to create these documents. Microsoft Office provides a variety of professional tools to assist in the construction of these documents. This includes but not limited to spreadsheet software, presentation software, word processing that supports team collaboration features.

Open Source Software
Open-source software (OSS) is computer software that is available in source code form: the source code and certain other rights normally reserved for copyright holders are provided under a software license that permits users to study, change, improve and at times also to distribute the software. The computer Science program attempts to integrate OOS into the program to minimize software cost and expose students to relevant research in Computer Science and Software Engineering.

MySQL SERVER
MySQL is the world's most popular open source database software. MySQL is an enterprise level Relational Database Management System (RDMS). It is Available under a "dual licensing" model, free software/open source GNU General Public License (commonly known as the "GPL"). Java's JDBC technology is an API that provides cross-DBMS connectivity to a wide range of SQL databases and access to other tabular

data sources, such as spreadsheets or flat files. In CSCI 112 several weeks are spent teaching students to process Structured Query Language (SQL) Data Manipulation Language (DML) statements through the Java programming language. Students learn to write platform independent Java programs that can be used to manipulate the data in a wide range of SQL databases without the requirement to modify and/or recompile the Java programs when moving from platform to platform or from DBMS to DBMS. This is briefly revisited in CSCI 211.
Additionally, MySQL server is used the CIS 205 Database Management Systems course.

Oracle Express Server
Additionally, students will also get exposure to Oracle Express Server. This demonstrates the transparency of Java Program Applications across multiple database platforms. Oracle Express is a free RDMS. Assist in further illustrating that Java programs can be used to manipulate the data in a wide range of SQL databases without the requirement to modify and/or recompile the Java programs when moving from DBMS to DBMS

The NetBeans Integrated Development Environment (IDE)
NetBeans is one of the most accepted application development environment in the software industry for developing applications in Java. This software development tool is used through CSCI 111, CSCI 112 and CSCI 211. The NetBeans platform allows application development from a set of modular programming components. It is a framework for simplifying the development of applications. The NetBeans IDE supports development of a variety of Java application types including: standard client applications, web applications, and mobile applications.

Note Pad ++
Notepad++ is a free (under the GPL license) source code editor which supports several programming languages under Windows environment. Notepad++ - is Notepad Plus Plus is a Notepad replacement program with features enhancement geared toward programmers. Some important features are letting users manage different documents simultaneously and the ability to zoom in on software code for presentations. Useful supported languages by Notepad++ are: C++, Java, C#, XML, HTML, PHP, batch file, SQL, Objective-C, CSS, and Flash action script. This application is used in CSCI 111, CSCI 112 and CSCI 211 to illustrate example code of algorithmic solutions.

Java Development Kit 7 (JDK 7)
The Java JDK is a free open source development framework for the Java programming Language. It contains all the predefined classes (Java Language Compiler, objects and associated methods) necessary to develop professional application in Java.

Java Runtime Environment (JRE) –
The JRE is a free open source Java Programming Language interpreter, also referred to as the Java Virtual Machine. The JAVA Virtual Machine is included in the JAVA JDK, it is required in the client computer in order to run Java applications.

Android Software Development Kit (SDK) –
Android is a software stack for mobile devices that includes an operating system, middleware and key applications. The Android SDK provides the tools and Application Program Interface (APIs) necessary to begin developing applications on the Android Operating System Platforms using the Java programming language.

Eclipse IDE for Java
Eclipse IDE for Java is an open source project focused on building an open development of extensible frameworks, tools and runtimes for building, deploying and managing Java software across the lifecycle of the Application. It contains essential tools for Java development, including a Java IDE, a CVS client, XML Editor, and Maven integration. The primary focus for using this application is its seamless integration with the Android SDK. Used to demonstrate software development for devices supporting the Android Operating System (OS)

JUnit – Unit Testing Framework

The JUnit testing framework is a free open source for programmer-oriented testing framework for Java. The JUnit framework is an open-source project. JUnit is a simple framework to write repeatable tests for Java applications. The framework permits programmers testing their own software. Typically testing is not closely integrated with development. This prevents programmers from measuring the progress of development; it is difficult to determine when application functionality starts working or when it stops working. Using JUnit programmers can cheaply and incrementally build a test suite that will help measure progress, spot unintended side effects, and focus development efforts. Students in CSCI 112 and CSCI 211 are exposed to the JUnit testing software.

Apache Tomcat

Apache Tomcat is an open source software implementation of the Java Servlet and Java Server Pages (JSP) technologies. It permit student to learn how to build web applications using servlets and JSP. Additionally, it permits students to deploy and test web applications. In CSCI 112 and CSCI 211 students are exposed to the basic steps of using Tomcat to set up a development environment, organize source code, and then build and test a web application.

Microsoft Macro Assembler SDK

An assembly language is a low-level programming language for computers, microprocessors, microcontrollers, and other programmable devices. It implements a symbolic representation of the machine codes and other constants needed to program in a given CPU architecture. An assembly language is specific to certain physical (or virtual) computer architecture. Assembler is used to translate assembly language statements into the target computer's machine code. CSCI 212 focuses on writing assembler programs for the Intel x86 and x86-64 processing chips CPU, processor registers and memory locations. The Microsoft Assembler Software Development Kit (SDK) is used as the application development tool for the course.

Hardware Needs

Currently, Computer Science requires standard desktop personal computers. The desktops must have memory and storage capable of running the standard college configuration of Windows and Microsoft Office. They should be configured with the standard data communication ports Universal Serial Bus (USB), DVD drives and networking access. Additionally, the desktops should have storage to install the software outlined above.

The Community College Baccalaureate:
A Proposal to Expand Career Pathways for Students

Submitted to

Pennsylvania State Board of Education
Mr. Larry Wittig, Chair

Submitted by

Bucks County Community College
Community College of Philadelphia
Delaware County Community College
Montgomery County Community College

February xxx, 2012

The Community College Baccalaureate:
A Proposal to Expand Career Pathways for Students

Proposal

Bucks County Community College, Community College of Philadelphia, Delaware County Community College and Montgomery County Community College seek authorization to offer selected baccalaureate-level curricula leading to one of three degrees: Bachelor of Applied Science; Bachelor of Applied Technology; or Bachelor of Science. In line with models that exist in at least seventeen other states, adding these options to current college offerings will enable the four community colleges in Southeastern Pennsylvania to provide a core of baccalaureate offerings, at an affordable tuition rate, that will expand pathways for students, particularly in career and technical areas.

Rationale

Since the first two-year public institution was founded in 1901, community colleges have evolved to provide increasing options for the approximately 12 million students who currently utilize their programs and services. Initially, in response to the demand of students not able to attend a university due to lack of qualifications or financial means, "post-graduate high school programs" (Associate of Arts) were developed for students desiring to transfer to four-year institutions. Other programs followed, including vocational, technical, workforce and remedial programs, as well as Associate of Science and Associate of Applied Science degree programs, the last of which was primarily considered a terminal degree.

In recent years, an increasing number of community colleges across the United States have begun offering selected baccalaureate degrees, particularly in areas tied to labor demands (see Appendix C for specific examples). This trend is further underlined by the 2010 Carnegie listing of Undergraduate Instructional Program Classifications. The Associate's Dominant classification now includes 240 institutions that award both associate's and bachelor's degrees, but the majority of whose degrees awarded are at the associate's level. Consistent with the fundamental philosophy of community colleges—access to postsecondary education, particularly for the unserved and the underserved—this proposal focuses on that same basic concept, the community college baccalaureate degree.

A number of factors reshaping higher education today have significant implications for the role of community colleges in offering selected baccalaureate degrees: an increase in jobs requiring the baccalaureate as the entry-level credential; the rising cost of tuition at baccalaureate-level institutions; limited programs and access to meet these demands; an older and part-time population of students who are in the workforce; and a more global market (Walker, 2005). There is also national, state and local interest in seeing an increase in the number of college degree-holders for purposes of economic stability and social equity.

President Barak Obama has challenged America to have the world's highest proportion of college graduates by the year 2020. According to 2010 U.S. Census data, Pennsylvania ranks 35th among our 50 states in the percentage of its residents who hold an associate's or bachelor's degree. Locally, Philadelphia Mayor Michael Nutter has established as one of his major goals doubling the city's 18 % college-attainment rate over the next five to ten years. Philadelphia currently ranks 83rd out of the 100 largest U.S. cities in the percentage of residents who hold college degrees. Community colleges, which enroll nearly half of all college undergraduates in the U.S., play an important role in meeting these college completion goals, especially in ensuring a diverse workforce and serving the growing number of students who balance work and family obligations with their studies.

Adding baccalaureate options to Pennsylvania's community colleges will increase geographical, financial and academic access to baccalaureate higher education. Such options will expand opportunity for students who balance full- or part-time employment, family obligations, limited options for commuting and limited options for attending college during regular business hours.

> Almost half of all undergraduates who attend college—including the majority of first-generation and minority students—attend one of the nation's community colleges. Of that number, close to one-half declare attaining a bachelor's degree as their goal, yet only an estimated quarter of those students manage to achieve transfer to bachelor's-level programs. This lack of transfer can mean a significant difference in individual earning power over a lifetime (*Improving Access to the Baccalaureate*, 2004).

Employment Needs

Most jobs in the "new knowledge economy" require a postsecondary education and are found in white collar office settings, education, health care, and science and advanced technology employment areas. "The share of education and health care jobs with at least some college degree increased from fewer than half in the 1970s to more than 75% today, with more than 52% with a bachelor's or graduate degree…. The share of technology jobs has doubled from roughly 4 to 8 % of all jobs. In 1973, 63% of technology workers had at least some college, while 86% now have postsecondary education. More than half have at least a bachelor's degree…" (Carnevale, Strohl and Smith, 2009, p. 23).

Between 2008 and 2018, new jobs in Pennsylvania requiring postsecondary education and training will grow by 181,000 (57%). The total job demand (new jobs and job openings due to retirement) at the baccalaureate and graduate levels by occupation is:

- Education 320,000
- Health Care Practitioners 235,000
- Sales 221,000
- Office and Administrative Support 167,000
- Management 140,000
- Computer and Mathematical Science 97,000
- Community and Social Services 95,000
- Financial Specialists 90,000
- Business Operations Specialists 83,000

(See "Projections of Jobs and Education," The Georgetown University Center on Education and the Workforce, June 2010, in Appendix A.)

The Philadelphia Workforce Investment Board (PWIB), which researches education/workforce alignment on a regular basis, has compiled a list of occupations aligned with existing applied baccalaureate programs in the U.S. and estimated the demand for those occupations in Southeast Pennsylvania (see Appendix B). Occupations estimated to be in high demand are: accountants/auditors, financial analysts, elementary school teachers, computer systems analysts, and registered nurses.

Both the Georgetown University and PWIB analyses identify career and technical occupations that are supported directly by community college associate degree curricula that could be expanded to include baccalaureate-level preparation as well.

The Rise in Entry Level Credentials

As noted above, one of the factors leading to consideration of community college baccalaureate options has been the move to increase entry level credentials for licensed fields such as nursing, interpreter education, and respiratory care.

<u>Nursing</u>

The U. S. Department of Labor estimates that there will be one million available nursing jobs in 2018 due to job growth and the number of retiring nurses. Simultaneously, the U.S. will experience an expected increase in an aging population (*Community College Times*, October

2010). For many years the primary source for producing registered nurses has been associate degree nursing programs. The American Association of Community Colleges (AACC) notes that "Half of all new nurses and the majority of other new health-care workers are educated at community colleges" (AACC 2011 Fact Sheet).

A recent report by the Institute of Medicine recommends increasing the percentage of nursing baccalaureate degree-holders from 50% to 80% by 2020. At St. Petersburg College, a Florida community college, the Bachelor of Science in Nursing (B.S.N.) program has had tremendous success. Students, particularly those in their 30s who have earned their associate degrees, are taking advantage of this two-plus-two program. Several local hospitals are encouraging this career growth opportunity by offering financial support to their nurses (Furlong, 2005). This is but one of many successful community college B.S.N. examples already thriving across the U.S.

In the past few years, two developments have impacted the hiring of associate degree nursing graduates: (1) a weak economy, coupled with the uncertainty of health care reform; and (2) implementation of a policy requiring an applicant to have a B.S.N. in order to be hired by some hospitals. In the Philadelphia region, Thomas Jefferson University, Hospital of the University of Pennsylvania, and Hahnemann University Hospital are magnet hospitals. A criterion for magnet hospitals is that the institution encourages nurses to continue their education. That is costly if reimbursement is involved, so these hospitals prefer to hire B.S.N. graduates only. Fox Chase Cancer Center also prefers B.S.N. graduates. However, while a B.S.N. is very strongly preferred, these hospitals make some exceptions for their employees or for outstanding graduates who completed an associate degree in nursing.

Elsewhere in the Delaware Valley, a B.S.N. is required at Main Line Health hospitals (Lankenau and Bryn Mawr) as well as the Veterans Administration Hospital. Main Line Health instituted new eligibility requirements for nursing hires beginning in December 2009: B.S.N. for all external applicants, GPA 2.8 or greater, and completion of two essay questions. They report that they had over 600 applications for 70 positions and that they filled all 70 positions with B.S.N. graduates. Further, they report that their current workforce is 55% B.S.N. Mercy Fitzgerald Hospital, a member of the Mercy Health System, is yet another example of an employer who has announced the B.S.N. requirement for future hires.

Community College of Philadelphia (CCP) nursing graduates of 2009 were, for the most part, successful in finding jobs. Most (81%) are working full time as registered nurses in a variety of settings (community clinics, psychiatric hospitals, rehabilitation, hospice, long term care), community hospitals (Mercy, Chestnut Hill), and teaching hospitals (Temple, Hahnemann, Albert Einstein). Alumni report that the job search was easier if they had been employed by the hiring hospital while a student and if they were enrolled in a B.S.N. program. One-third of the 2009 alumni reported that they had begun to study for a B.S.N. within six months of graduation.

There is consensus among nursing educators that the trend of associate degree nursing students enrolling in a B.S.N. program immediately upon graduation is increasing and will continue to increase. For community colleges, which continue to provide the bulk of new registered nurses nationally, multiple pathways into the nursing profession (L.P.N., A.D.N., B.S.N.) are a natural outgrowth of the community college mission. In expanding the pool of baccalaureate-prepared nurses, community colleges can address another significant issue, the predicted nurse educator shortage in the country. The average age for nursing faculty is 56 years old. A larger baccalaureate pool will be required to produce replacement nurses with master's and doctoral degrees.

<u>Interpreter Education</u>

A second example of evolving entry-level requirements can be found in interpreter education. In Pennsylvania there are four accredited programs for American Sign Language interpreters: Bloomsburg University (B.S.); Mount Aloysius (A.A., B.A.); Community College of Philadelphia (A.A.S.); and Community College of Allegheny County (Certificate). Currently, students can sit for the National Interpreter Certification if they hold at least an associate's degree. By 2012, students will need to have a bachelor's degree (in any field, not necessarily interpreter education) to take the examination, a motion passed by the membership of the Registry of Interpreters for the Deaf in 2003. With a strong job market for nationally certified sign-language interpreters, the demand for programs will only increase.

Again, where an associate degree level curriculum already exists, expanding to a bachelor's level program is a natural outgrowth of current faculty and program expertise, as well as direct credential support for local or regional workplace demand.

<u>Respiratory Care</u>

Depending on their training, respiratory therapy majors can become respiratory therapists, respiratory therapy technicians, pulmonary function technologists, or neonatal-pediatric specialists. With more education and experience, they may advance to management positions, becoming medical and health services managers. According to the U.S. Bureau of Labor Statistics, the outlook for careers in the field of respiratory therapy is very good. Respiratory therapists with a specialization in pediatrics or cardiopulmonary care are expected to have the best opportunities.

Although the Commission on Accreditation for Respiratory Care (CoARC) supports the development of academic advancement pathways for the associate degree graduate in gaining baccalaureate and graduate degrees, the members of the Commission continue to strongly support the associate degree as the minimum degree required for entry to the profession.

However, one of the ten recommendations from the "Transitioning the Respiratory Therapist Workforce for 2015 and Beyond" conference in July 2010 was to request that CoARC change its standards to require a baccalaureate or graduate degree for entry into the profession. Currently, about 85 percent of respiratory care programs in the United States are two-year programs.

In addition, in the Greater Philadelphia Region, Thomas Jefferson University and Children's Hospital of Philadelphia are already de facto requiring baccalaureate-prepared candidates for their respiratory positions (Source: CCP Respiratory Care Advisory Committee meeting, November 16, 2011).

Nursing, interpreter education and respiratory care are but three examples of the changes that are developing, usually in licensed professions, in entry level credentials required for future certification.

Economic Stability

As national and global economies evolve, there will be greater demand for programs which integrate academic pedagogy with applied learning strategies relevant to employment. A community college baccalaureate will allow people working full-time to earn a degree at a community college who might otherwise not be able to do so. This has economic impact implications. "By collaborating closely with employers, the community college can develop a curriculum that is relevant and immediately applicable to current and emergent needs, especially those that require a baccalaureate degree for entry or advancement within that profession" (Walker and Floyd, 2005, p. 96).

An increase in such programs can also make the U.S. more competitive in the global market by producing skilled and credentialed workers. Since baccalaureate degree holders earn more, they will also contribute to local, state and regional economic stability. In the applied program, the majority of technical and discipline major courses will be offered at the associate degree level, and there will be a shift of some general education courses to the upper division (Wallace, 1999). "Also, because of most four-year colleges' reluctance to offer an applied baccalaureate, the community college would not be competing with senior institutions or duplicating their programs" (Townsend, 2005, p. 181).

Access

With more career-oriented students looking to further their education in order to increase career mobility, there is mounting concern that four-year schools will not be able to meet the demand.

A 2003 survey conducted by the Community College Baccalaureate Association was sent to 500 presidents, of whom 101 responded. Some of the findings were:

- Over a third of respondents indicated that four-year institutions in their area are not meeting baccalaureate demand.

- More than a third affirmed that the majority of their students do not transfer to four-year colleges and universities because of geographical or financial barriers.

- Over two-thirds agreed that there are specific, high-demand career fields that require a baccalaureate and that currently the four-year institutions in their area are not meeting these demands (Floyd, 2005, p. 42).

More recently, Judith Bilsky, executive vice chancellor in the Florida Department of Education's Office of Student and Academic Success, noted that community college baccalaureate programs in that state have enrolled a different population from university baccalaureate programs: "For instance, whereas three-fourths of the students in the state's public four-year institutions are between the ages of 18 and 25, more than three-fourths of students in community college baccalaureate programs are older than 26 (with most of those being older than 35)" (Inside Higher Ed, 8/12/10). Bilsky added, ". . .these new [community college baccalaureate] programs are also attracting students from 'underserved populations' that have not typically thrived at the state's four-year institutions. She does not expect future expansion of these degrees to 'compete' in any way with those offered by existing state universities" (Inside Higher Ed, 8/12/10).

Community Colleges in Other States Offering the Baccalaureate

"As degree requirements increase, community colleges have begun offering bachelor's degrees and postgraduate certificates, especially in occupations and professions with strong ties to local labor markets such as education, health care, and information technology" (Carnevale, Strohl and Smith, 2009, p. 29).

The chart in Appendix C lists 42 community colleges in 15 states offering baccalaureate degrees, many in applied areas (Community College Baccalaureate Association website). The most popular fields are Nursing, Education, Health Care, Business, Information Technology, and Public Safety.

In Florida, the community college baccalaureate movement is strongest. A recent count indicated that 19 of the state's 28 community colleges offer 111 baccalaureate degrees. Most are in education and nursing; however, there has been growth in the applied science programs such as public safety management, fire science management, interior design, and project and acquisitions management ("Florida Analysis" of Florida's Office of Program Policy Analysis, April, 2005).

The University of Wisconsin's two-year colleges will soon offer limited bachelor of applied arts and sciences degrees to serve students in mostly rural areas (CCBA *Beacon*, Vol. 12, No. 2, Fall 2010). Three Texas community colleges offer degrees in applied fields aligned with demands of industries in their areas. Three of Hawaii's community colleges have focused on applied degrees in business and information technology, computer electronic technology, and culinary arts.

Colleges with Applied Baccalaureates in Pennsylvania

The principal example of an institution committed to applied baccalaureate options in Pennsylvania is the Pennsylvania College of Technology, a special mission affiliate of The Pennsylvania State University. Formerly Williamsport Technical Institute and part of the state's community college sector, the Pennsylvania College of Technology offers certificate, associate and baccalaureate degree programs relating to more than 100 different career areas. Unique Bachelor of Science (B.S.) programs provide opportunities for students to develop their technical foundation skills and advance into management and specialty positions. As of fall 2010, the largest B.S. majors were: Network Specialist, Civil Engineering Technology, Construction Management, and Residential Construction Management.

Potential Baccalaureate Programs at Southeastern Pennsylvania Community Colleges

Bucks County Community College, Community College of Philadelphia, Delaware County Community College and Montgomery County Community College currently offer a range of certificate and associate degree programs that are aligned with the major industry sectors of Southeast Pennsylvania. These four institutions already collaborate in several programmatic arenas.

First, our four colleges, in concert with one New Jersey community college and Drexel University, comprise the Collegiate Consortium for Workforce and Economic Development. Through the Consortium, we have for many years pooled our curriculum and human capital assets in providing a broad array of education and training to employers across our Greater Philadelphia Region.

Second, our four institutions have in place a longstanding commitment to "shared programs." Each of the four colleges publishes in our respective catalogs unique programs in which our sister institutions' students may enroll at our respective in-county tuition rates. This initiative has helped us to avoid duplicating small, expensive programs, yet still serve our prospective students with an even broader array of program choices.

Finally, all four colleges have numerous written articulation agreements in place with area 4-year colleges and universities. In some cases, these agreements were developed in tandem with all of the community colleges and the receiving 4-year institution. (Our common core to core agreement with Temple University serves as one example.)

Adding community college baccalaureate options will not replace existing transfer partnerships with senior colleges. We expect that current 2+2 models, co-located baccalaureate partnerships and distance learning prototypes will continue as baccalaureate pathways for our students. However, we believe the additional option of selected community college baccalaureate programs will position us to better serve the region and its residents in the decades to come.

Bucks County Community College, Community College of Philadelphia, Delaware County Community College and Montgomery County Community College envision offering a small set of complementary baccalaureate options over an initial period of five years. Each of these curricula will be built on existing associate degree programs. The choice of final degree offerings will be based on strength of program, employment opportunities in the field, access to the student and availability of the program across the region. Prospective programs include:

- American Sign Language/English Interpreting (Philadelphia)
- Automotive Technology (Montgomery)
- Computer Forensics (Bucks, Philadelphia)
- Culinary Arts (Montgomery)
- Health Information Technology/Health Informatics (Bucks, Delaware)
- Historic Preservation (Bucks)
- Hospitality Management (Montgomery)
- Nursing (Bucks, Delaware, Montgomery, Philadelphia)
- Respiratory Care Technology (Philadelphia)
- Sports Management (Bucks)

Student Interest

In a preliminary survey conducted at Community College of Philadelphia, there appears to be strong student interest in the ability to complete a baccalaureate degree on campus. Of 293 students surveyed at our Northeast and Northwest Regional Centers during the fall 2010 semester, 241 (82%) responded with interest. The most popular majors cited were Nursing, Education, and Business. Additionally, in annual alumni surveys, as well as ongoing student satisfaction surveys, a significant number of Community College of Philadelphia graduates and non-graduating former students have expressed a preference for the opportunity to complete a baccalaureate degree at the College.

Financial Resource Requirements

Initial implementation of baccalaureate programs in the Southeast Pennsylvania region will see one to three baccalaureate curricula phased in at each of the four community colleges, respectively, over a period of five years. Based on analysis and data associated with community college baccalaureate implementation in Florida, we have developed the following assumptions regarding required financial resources.

- The size of baccalaureate program student population will be modest relative to the existing student body.
- Because the baccalaureate programs are extensions of current associate degree curricula, no new physical spaces will be required.
- Program development and supervision will be handled by existing vice presidents, deans and department heads.
- An Office of Baccalaureate Studies will be required to handle issues such as recruitment and admissions support, student services unique to the bachelor's degree student and miscellaneous administrative issues.
- Teaching strategies will be similar to ones employed in 100- and 200-level courses.
- Differential tuition charges can be used to offset costs associated with smaller classes and administrative support. Average community college baccalaureate tuition will fall below average state university tuition for baccalaureate programs.
- Any additional faculty hired to teach the needed upper-division courses will be paid at salary levels consistent with current faculty contracts.
- Teaching workloads for faculty teaching upper-division courses will be the same as in lower-division courses.
- Average class sizes in upper-division courses will likely average 15 as opposed to the current 21 in lower-division courses at our four institutions. As a result, direct instructional costs will be 40 percent higher.

- There will be no additional local sponsor or State funding in support of the colleges' move to offer baccalaureate programs.

Accreditation

The addition of selected baccalaureate options at our four community colleges represents a "Substantive Change" as defined by the Middle States Commission on Higher Education. Specifically, Middle States must give approval for "The addition of programs of study at a degree or credential level different from that which is included in the institution's current accreditation" (Middle States Substantive Change Policy Statement, November 18, 2010).

Our four institutions believe that we shall have in place documentation that responds to all Substantive Change content requirements, including enrollment; finances; quality management controls; staffing plans for faculty, administration and student services; implementation timetable; and evaluation of implementation progress. The Middle States process will proceed concurrently with our request to the Commonwealth, as contained in this proposal.

In addition, several of the potential baccalaureate programs listed above are examples of curricula leading to licensed professions, each of which requires accreditation from a recognized entity in the profession (the National League for Nursing Accrediting Commission, for example). For those programs, the colleges will seek approval of a change in accreditation status, documenting full compliance with required standards and criteria.

Measures of Impact

Within individual community colleges, impact will be measured in the number of students completing the baccalaureate and obtaining jobs in the field of study. The income levels of those graduates and their impact on the local and state economy is another important measure. .

Townsend (2005) recommends other areas of research to monitor the impact of the community college baccalaureate (CCB). She asks:

- What is the effect on the institutional mission, culture, finances, and workforce programs?

- How are transfer enrollments affected at four-year institutions?

- Is there a difference in the income levels and further educational attainment of community college baccalaureate graduates from those graduates of traditional four-year institutions?

- Is degree completion higher in states where the community college baccalaureate is offered?

Conclusion

Community colleges are known for their innovation and agility in responding to the needs of the labor market and in providing access to a diverse population, many of whom would not otherwise have the opportunity for post-secondary education and the benefits that accrue both personally and financially. The community college baccalaureate will provide even greater access at less cost and will open the doors even wider to the benefits that come from an educated populace.

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