Meeting of the Student Outcomes Committee, Thursday, May 18, 2023

(1) Public Session

(a) Introduction (I)

(b) Mathematics Associate of Science (A.S.)
Academic Program Review (A)

Guests: Dr. Vishal Shah, Dean of Math, Science and Health Careers; Dr. Brenton Webber, Department Head for Mathematics, Assistant Professor; Elizabeth Gordon, Assessment and Evaluation Coordinator; Dr. Amy Birge-Caracappa, Director of Assessment

    Mathematics APR 2022-2023 Executive Summary 5-3 for SOC (1).pdf

(c) Liberal Arts Associate of Arts (A.A.) Academic
Program Review (A)

Guests: Dr. Lisa Sanders, Assistant Dean/Interim Dean of Liberal Studies; John Joyce, Associate Professor of English; Osvil Acosta-Morales, Department Head for Humanities, Associate Professor; Elizabeth Gordon, Assessment and Evaluation Coordinator; Dr. Amy Birge-Caracappa, Director of Assessment

    Liberal Arts APR 2022-2023 Executive Summary 5-3 for SOC (1).pdf

(d) Business General Associate of Arts (A.A.)
Academic Program Review (A)

Guests: Arielle Norment, Interim Dean, Division of Business & Technology; Ruqayyah Archie, Associate Professor of English, Assistant Professor of Accounting, BUSX & Accounting Program Coordinator; Elizabeth Gordon, Assessment and Evaluation Coordinator; Dr. Amy Birge-Caracappa, Director of Assessment

    Business General APR 2022-2023 SOC Executive Summary.pdf

(e) Faculty Promotion Recommendations (A)

- Review of promotion process

- Overview of criteria

- Overview of faculty being recommended for promotion

(f) New Business

Community College *of* Philadelphia

Academic Program Review:
Mathematics A.S.

Authors: Brenton Webber, Dawn Sinnott, Ph.D.
Spring 2023

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Executive Summary

The Associate of Science degree in Mathematics is a stellar program at the College and a cornerstone of the STEM cluster.

KEY FINDINGS

Enrollment

1. Enrollment
   a. Enrollment in the Mathematics (Math) program between Fall 2017 and Fall 2022 is small but stable, with an average of 16 students per semester. During this period, enrollment in the Mathematics program increased by 46%, while enrollment at the College decreased by 33%; see Exhibit 1.
   b. The Mathematics Department is the hub for upper-level mathematics education at the College. Mathematics is both a fundamental discipline and a course requirement for students majoring in biology, chemistry, computer science, and engineering. A strong mathematics background is essential to the advanced study of the physical and biological sciences and is integral to studying higher-level social sciences. Aggregate measures find that 77.9% of all students enrolled in MATH 163 - MATH 271 were successful; see Exhibit 1b.

Exhibit 1a: College and Mathematics Enrollment											
	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Average
College-Wide	17,296	16,503	16,671	15,544	15,996	14,789	13,673	12,195	11,647	10,431	11,636	14,216
MATH	13	17	10	17	15	17	17	16	15	18	19	16

Exhibit 1b: Success in Upper-Level MATH Courses						
Term	Subject Code	Course Number	Successful (A, B, C)	Unsuccessful (D, F)	Withdrawn	Enrollment
Fall 2022	MATH	163	62.4%	8.2%	29.4%	85
	MATH	171	86.4%	6.2%	7.4%	162
	MATH	172	89.8%	6.8%	3.4%	59
	MATH	270	100.0%	11.5%	61.5%	45
	MATH	271	90.9%	0.0%	9.1%	11
		Average	77.9%	6.6%	15.5%	362

2. Enrollment and Demographics
   a. The Math program's average full-time enrollment (48.9%) is notably higher than the College average (29.1%); see Exhibit 2a.
   b. Enrollment by Gender within Race; see Exhibit 2b.
      - On average, the Math program's distribution of gender and ethnicity indicates a higher percentage of Asian males (12%) than the College (5%).

- On average, the Math program's distribution of gender and ethnicity indicates a higher percentage of Black males (22%) than the College (13%).
- On average, the Math program's distribution of gender and ethnicity indicates a higher percentage of Hispanic males (13%) than the College (5%).
- On average, the Math program's distribution of gender and ethnicity indicates a higher percentage of White males (20%) than the College (8%).
- On average, the Math program's distribution of gender and ethnicity indicates a higher percentage of males (67%) than the College (31%).

c. On average, Math students are representative of the College-wide age distribution with the average proportion of students between 22 to 39 years of age (53.4%) slightly higher than that of the College overall (48.9%); see Exhibit 2c.
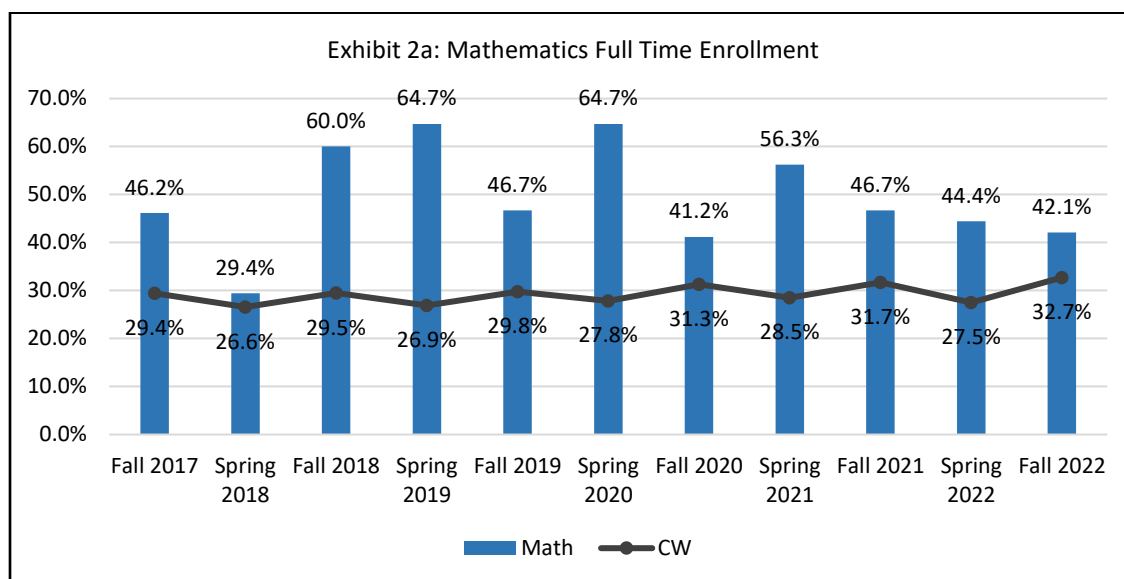

Exhibit 2a: Mathematics Full Time Enrollment

Exhibit 2b: Gender and Ethnicity by Mathematics Studies Majors (Other and Unknown not included)		Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Average	College Average
Asian	Female	6%	20%	18%	0%	0%	0%	0%	0%	0%	11%	5%	6%
Asian	Male	6%	0%	12%	20%	24%	24%	19%	13%	6%	0%	12%	5%
Black	Female	6%	0%	0%	0%	0%	12%	13%	7%	0%	5%	4%	30%
Black	Male	18%	20%	24%	27%	24%	18%	25%	33%	28%	16%	22%	13%
Hispanic	Female	0%	10%	0%	7%	6%	6%	0%	0%	11%	16%	5%	11%
Hispanic	Male	18%	20%	12%	20%	6%	6%	13%	13%	11%	11%	13%	5%
White	Female	18%	20%	12%	13%	18%	12%	13%	7%	6%	16%	14%	14%
White	Male	18%	10%	24%	13%	24%	24%	19%	20%	28%	16%	20%	8%
											Female	28%	61%
											Male	67%	31%

Exhibit 2c: Average Age of Enrolled Students Fall 2017-Fall 2022
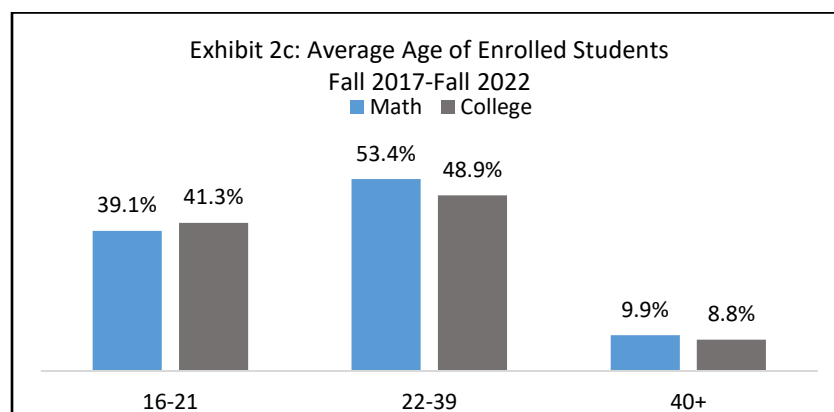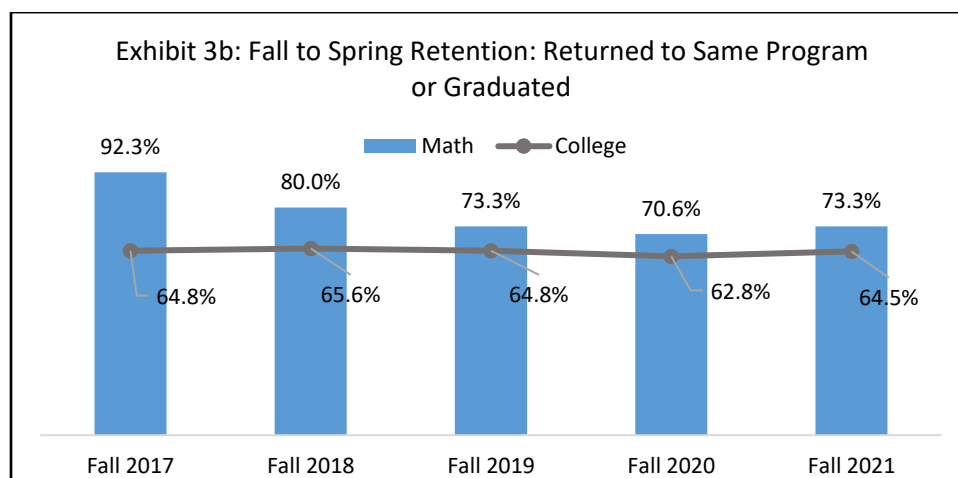
Retention – Returned or Graduated

3. Fall to Spring Retention
   - Between Fall 2017 and Fall 2021, the Math program's Fall to Spring retention, Returned to Same Program, averaged 10 points higher than the College average; see Exhibit 3a.
   - On average, 81% of Math students returned to the same program or graduated, while 64.6% of students College-wide returned to the same program or graduated; see Exhibit 3b.

Exhibit 3a: Fall to Spring Retention							
MATH	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Average	College Average
Headcount	13	10	15	17	15	14	15,056
Returned to Same Program	92.3%	70.0%	66.7%	58.8%	73.3%	71.4%	61.4%
Returned to Different Program	7.7%	20.0%	0.0%	0.0%	0.0%	10.7%	4.2%
Graduated	0.0%	10.0%	6.7%	11.8%	0.0%	9.5%	3.2%
Did Not Persist	0.0%	0.0%	26.7%	29.4%	26.7%	31.0%	31.3%

Exhibit 3b: Fall to Spring Retention: Returned to Same Program or Graduated

4. Fall to Fall Retention between Fall 2017 and Fall 2021
    a. The Math program's Fall to Fall Percent Graduated category (24.3%) was more than double the College average (11%); see Exhibit 4a.
    b. On average, 55.7% of MATH students returned to the same program or graduated, while 45.7% of students College-wide returned to the same program or graduated; see Exhibit 4b.

Exhibit 4a: Fall-to-Fall Retention							
Fall to Fall Retention	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Average	College Average
Headcount	13	10	15	17	15	14	15,056
Returned to Same Program	23.1%	30.0%	26.7%	23.5%	53.3%	31.4%	34.6%
Returned to Different Program	15.4%	10.0%	0.0%	0.0%	0.0%	4.3%	6.9%
Graduated	15.4%	40.0%	33.3%	23.5%	13.3%	24.3%	11.0%
Did Not Persist	46.2%	20.0%	40.0%	52.9%	33.3%	40.0%	47.4%

Exhibit 4b: Fall to Fall Retention: Returned to Same Program or Graduated
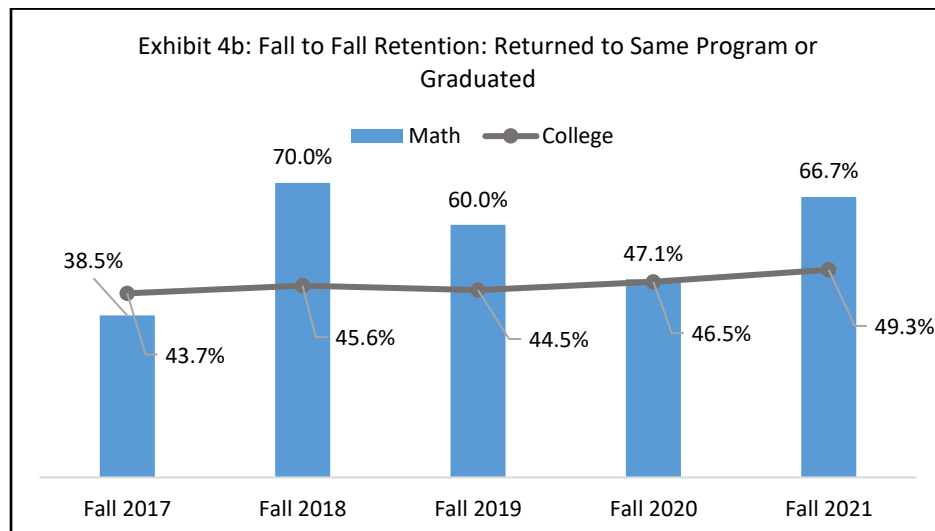
Transfer

5. Students whose first semester at the College was between 2016-2020 and whose last CCP major was Mathematics
   a. More than fifty percent of graduates have transferred.
   b. Forty-three percent of all enrolled Math students have transferred.

Departing Students who Entered the College between 2016 and 2020					
Exit Status	Transfer		Did Not Transfer		Total Count of Departing Students
	Count	Percent	Count	Percent	
Graduate	9	56%	7	44%	16
Earned 45 or more credits	3	30%	7	70%	10
Earned 23 to 44 credits	5	45%	6	55%	11
Earned 12 to 22 credits	2	50%	2	50%	4
Earned less than 12 credits	0	0%	3	100%	3
Grand Total	19	43%	25	57%	44

Post-CCP transfer institutions

Frequent Transfer Institutions		
Temple University	Public	4-year
University of Pennsylvania	Private	4-year
Drexel University	Private	4-year
University of Pittsburgh	Public	4-year
Rosemont College	Private	4-year
West Chester University	Public	4-year
St Joseph's University	Private	4-year

Faculty

6. Community College of Philadelphia Mathematics Department faculty should be recognized for their dedication to teaching and academic scholarship.
   - All Math faculty have at least a master's degree in mathematics, and 10 out of 14 (71.4%) have a doctorate.
   - Members of the CCP Mathematics Department are known and respected among the international community for their contributions to the field regarding their research and scholarship; see page 18 for detail table.
   - The average years of service in the program = 24.9.

Hired Date	Years of Service (as of Dec. 2022)	Highest Credential
Spring 1985	38	M.S.
Fall 1990	32½	Ph.D.
Fall 1991	31½	Ph.D.
Spring 1993	30	Ph.D.
Spring 1996	27	Ed.D.
Fall 1995	27½	Ph.D.
Fall 1998	24½	M.A.
Fall 1999	23½	M.A.
Spring 2001	22	Ph.D.
Spring 2003	20	M.S.
Fall 2002	20½	Ph.D.
Spring 2005	18	Ph.D.
Fall 2006	16½	Ph.D.
Fall 2006	16½	Ph.D.
Average	**24.9**	

Regional Trends in Community College Math Programs:

Within the 500 miles of Community College of Philadelphia, twenty-four community colleges offer Associate Degrees in Mathematics. In 2021, a total of 121 students graduated from these colleges. The median graduation number from each institution was four students. Of the twenty-four colleges, Community College of Philadelphia is ranked sixth, along with other colleges that graduated five students. This speaks to the strength of the program. As can be seen in the Table below, Math program graduation rates remained stable throughout the pandemic.

Institution	Associate's Degree Completions (2021)	Growth % YOY (2021)	Market Share (2021)	IPEDS Tuition & Fees (2021)	Completions Trend (2017-2021)
⊞ CUNY Hostos Community College	25	-35.9%	20.2%	$5,208	
⊞ CUNY Borough of Manhattan Community College	15	-51.6%	12.1%	$5,170	
⊞ Anne Arundel Community College	11	37.5%	8.9%	$8,900	
⊞ Bucks County Community College	8	14.3%	6.5%	$9,098	
⊞ CUNY Bronx Community College	8	0.0%	6.5%	$5,206	
⊞ Community College of Philadelphia	5	25.0%	4.0%	$8,688	
⊞ Harrisburg Area Community College	5	25.0%	4.0%	$8,295	
⊞ Union County College	5	-16.7%	4.0%	$10,562	
⊞ Essex County College	5	400.0%	4.0%	$8,966	
⊞ Rowan College of South Jersey Gloucester Campus	4	-66.7%	3.2%	$5,550	

PRIOR AUDIT

Responses to Action Items in Prior Audit: Mathematics Program

Following the Mathematics program audit of 2018, the Student Outcomes Committee requested that the following action items be addressed:

1. Active Learning

- The program should incorporate more active learning techniques, including study groups.

Program Update: Active learning encompasses a collection of instructional methods and strategies based on the premise that students learn more effectively if they are actively involved in the learning experience (as opposed to *passive learning,* where the student is doing little more than either listening or watching). Although many of the techniques and ideas included in active learning have been around for much longer, the phrase "active learning" was applied to these methods collectively in the early 1990s. It became more popularized in the period after 2005. Active learning encompasses a variety of techniques designed to actively engage the student in *doing and thinking about* the concepts and skills in a course.

- Mathematics has long been a discipline that requires the student's active involvement. A colleague once said of mathematics, "one cannot learn to swim by merely watching people swim; one must actually get in the water." The various methods under the "active learning" umbrella are often employed in college mathematical instruction, including at CCP. Various mathematical organizations and reports have discussed and encouraged the incorporation of these learning methods.
- In a recent survey of the Mathematics Department (with 63.2% response rate) all respondents indicated that they were familiar with active learning methods and had either used or were currently using active learning practices in the classroom.
- Faculty indicated that they were incorporating one or more active learning methods in their instruction and had been for a number of years. Methods used include but are not necessarily limited to journaling, think-pair-share, short problem sessions, interactive lecture, group projects, discussion prompts, flipped classrooms, collaborative learning, and group problem-solving (in and out of the classroom). In particular, the emphasis on collaborative work in the two capstone courses (MATH 271: Calculus III and MATH 272: Differential Equations), along with a focus on reading and writing of mathematical discourse, all synergistic with active learning methods, are also considered high-impact practices and speak directly to the general education measures in the Quantitative Reasoning essential skill.
- Faculty have also incorporated interactive technology in the classroom and out. The utilization of interactive learning surfaces as well as media resources, has enhanced the learning experience for students. With the current development of the HyFlex instructional modality, we expect this enhancement to continue. We are currently piloting a HyFlex section of MATH 161: Precalculus I this semester and expect to extend this to include MATH 171: Calculus I in Fall 2023. We plan to expand the number of HyFlex sections of other core program MATH courses, thus directly supporting student success in these courses and the Mathematics degree program.

- A few faculty have given presentations both here and at other colleges about the effectiveness of active learning and discussing how to incorporate such methods into mathematical instruction. Faculty state that the methods used were effective depending on the course, the content, and the students themselves. The department feels that the appropriate incorporation of active learning methods and technology are integral components of mathematical learning and student success.
- Determining the correct level to which one incorporates active learning into one's instruction is a key issue. As described in several journal articles, while these methods make for effective hands-on experience, they are more time-consuming than basic lectures and discussions used in other types of courses. The goal is to find the appropriate balance of active learning; too little leaves the student taking too passive a role in their learning, while too much impedes the necessary delivery of content in a fixed time length (of one semester). All CCP Math faculty have had multiple conversations about effective classroom and instructional methods, which is an ongoing discussion point.
- The department will continue exploring, discussing, and trying various instructional methods and strategies as they develop. Student learning will be evaluated in line with the Department Assessment Plan with an eye toward the improvement of student learning.
- As part of the department's ongoing assessment, we have been tracking various student performance indicators in light of our continued efforts to improve instruction (including active learning methods). Data was collected and analyzed for the general student body taking upper-level MATH courses, specifically mathematics majors, over the last five years. The assessment data indicates that for the general math student, the average GPA for these courses increased by an average of 0.05 points per semester; pass rates increased at a rate of 2.5% per semester, and withdrawal rates decreased by 1.2% per semester. For mathematics majors, the changes were: +0.03 for GPA, +3.7% for pass rates, and −2.5% for withdrawal rates, all per semester. We believe these indicators are very encouraging and indicate the effectiveness of the department's strategies.

Study Groups
- The Learning Lab provides scheduled workgroups to support certain courses or sections as resources permit. These workgroups align with the specific content of a course. A number of students take advantage of these workgroups, but others cannot benefit from these workgroups due to external time constraints. There are tutors available for some (but not all) of the courses in the A.S. degree. The department feels that more could be done in this direction and has pushed for more support for the upper-level courses. The department has shared these concerns with the relevant areas of the college. Since Educational Support Services is not under the purview of either the Mathematics Department or its Dean, the department has limited influence over this issue.
- Every instructor encourages students to form study groups or attend the workgroups mentioned above, especially in the courses in the Mathematics A.S. program. Many sections form these groups, and those who participate in study groups or workshops find them beneficial. This has been a common practice for many years (possibly decades). Some of these study groups have persisted beyond the College and continue at the students' four-year institutions.
- The greatest impediment to students benefiting from the available support opportunities is the time demands placed on them from outside college. The department welcomes the opportunity to work with the college community to address this ever-present challenge.

2. Assessment
    - Develop and implement a plan for formalizing collaboration on assessment.

    Program Update:

    Reporting
    - In the past, the department has provided assessment documentation to the Dean and to whoever had asked for it. Since Fall 2017, the department has sent all assessment reports to Computer Science and Engineering for courses in their programs. Any department or program that wishes to receive the documents (that do not already get them) can send a notice to the Mathematics Department Head, and they will get copies as they become available.
    - Ideally, the department will also receive reports from these programs and departments.
    - It is also the department's expectation that the College will develop an assessment clearing house where these reports and the information within will be easily retrieved by anyone interested.

    Collaboration
    - The department regularly communicates with the Computer Science and Engineering Science programs at least twice yearly to discuss matters of mutual interest, including student success. Other programs are welcome to request regular meetings as well.
    - With the inception of the Science & Technology Pathway Committee, these sorts of collaborations have become easier to manage and facilitate.

3. Student Learning Outcomes
    - Establish a plan to ensure student learning outcomes are addressed throughout the curriculum and used to improve program content and student-centered teaching methods continuously.

    Program Update:
    - When the Department developed its assessment plan using the newly established Course Learning Outcomes (CLOs), it selected an expectation of 60% compliance with the CLOs based on the course performance indicators. Each CLO was categorized as "fundamental," "intermediate" or "advanced" based on the complexity of the topic and where it fell in the scaffolding of the subject material. This was the basis used in the first two assessment reports. The department had intended to re-evaluate whether the expectations for each category of complexity should be raised to higher levels and whether any of the CLOs' complexity ratings should be adjusted up or down a level after the second assessment report period. The results of the second assessment report revealed some unexpected areas where CLOs were not being met. The department discussed these results and was unsure whether the figures shown in the second assessment (which were counter to those in the first) indicated a downward trend or merely a momentary dip in compliance.
    - The department elected to set aside the discussion of revising the expectation thresholds and complexity rankings until a later time and instead address the areas of underperformance in the learning outcomes. The department determined that trends in performance were complicated by the relatively small sample sizes involved and recommended focusing instructional intervention on the course-level objectives that were

identified as needing improvement by emphasizing and reinforcing the relevant topics within those objectives and using more motivating examples.

- With subsequent assessments, the department was able to show that these interventive measures were sufficient to improve course learning in the underperforming areas and did not warrant more extensive responses. The department believes there was a high probability that the observed underperformance results were anomalous and that the recommendations prescribed were sufficient to reliably bring the CLOs into compliance for future assessments. The 2022 Assessment Report finds that all course learning outcomes are at the preferred level of compliance, and in particular, the outcome for the fundamental level of PLO 1 (Prove mathematical statements) has shown distinct improvement. Additionally, the report finds that success rates have improved in MATH 171, and success rates in MATH 171, 172, 271, and 272 compare favorably to the College.

CSLO Compliance
- The following table indicates the compliance with each CLO and its articulation with the program outcomes from the 2013-2014 assessment period forward. The program has articulated three broad PLOs: **1)** Prove mathematical statements, **2)** solve mathematical problems and **3)** execute mathematical algorithms. These PLOs align with a series of 35 Course Level Student Learning Outcomes (CSLO); the PLOs are assessed by assessing the 35 corresponding CSLOs. For example, the PLO "Solve mathematical problems" is, for one, assessed by evaluation of the course student learning outcome "Solve problems involving basic concepts of logic, set theory and functions." The benchmark for success in the Mathematics program is now 80%.

Student Learning Objective	Level	Outcome SP 2014	Outcome SP 2016	Outcome SP2018	Outcome SP2022	Change	Comment
1) Prove mathematical statements.	Fundamental	73.7%	59.4%	71.4%	87.2%	**15.8%**	*Expectation met*
	Intermediate	66.1%	78.4%	79.4%	80.2%	**0.8%**	*Expectation met*
	Advanced	63.8%	79.3%	77.8%	90.5%	**12.7%**	*Expectation met*
	TOTAL	**67.8%**	**70.2%**	**74.8%**	**85.5%**	**10.7%**	*Expectation met*
2) Solve mathematical problems.	Fundamental	75.0%	62.0%	76.3%	89.5%	**13.2%**	*Expectation met*
	Intermediate	70.9%	64.0%	73.7%	84.7%	**11.0%**	*Expectation met*
	Advanced	67.6%	78.5%	73.9%	82.8%	**8.9%**	*Expectation met*
	TOTAL	**71.1%**	**65.2%**	**74.7%**	**86.5%**	**11.8%**	*Expectation met*
3) Execute mathematical algorithms.	Fundamental	72.7%	62.3%	75.0%	87.3%	**12.3%**	*Expectation met*
	Intermediate	70.3%	69.2%	77.5%	84.8%	**7.3%**	*Expectation met*
	Advanced	65.3%	77.6%	**71.6%**	84.6%	**13.0%**	*Expectation met*
	TOTAL	**69.6%**	**68.3%**	**75.2%**	**85.9%**	**10.7%**	*Expectation met*
TOTAL	Fundamental	73.9%	61.7%	76.3%	87.3%	**11.0%**	*Average*
	Intermediate	70.9%	67.1%%	73.7%	84.8%	**11.1%**	*Average*
	Advanced	67.6%	78.2%	73.9%	84.6%	**10.7%**	*Average*
	TOTAL	**70.9%**	**67.0%**	**74.7%**	**85.9%**	**11.2%**	*Average*

ACTION ITEMS

- The OAE makes the following recommendations based on the Key Findings and Program Narrative:

    A. Enrollment and Demographics

    1. Increase Enrollment as follows:

	Fall 2020	Fall 2023		Fall 2025		Fall 2027	
	(Bench-mark)	Increase in Headcount*		Increase in Headcount		Increase in Headcount	
Headcount	17	19	10%	30*	10%	35*	10%
Returned to Same Program	24%	5	26%	6	28%	7	30%
Graduated	24%	4	24%	5	25%	6	25%
*Combination of Traditional and Applied Math; projected enrollment growth is also subject to the availability of College resources, particularly in areas of recruitment, admissions, and support for faculty, material, and supplies, as needs develop.							

    2. **International Student Recruitment:** There is a larger demand for Mathematics (Traditional and Applied Mathematics) within the international student population. The program can achieve the projected increase in enrollment if it receives support in recruiting international students. In a 2021 report issued by the United States Immigration and Customs Enforcement, Mathematics was among the top twenty educational majors for students in the United States. 6% (69,495 students) of all the students who came to the United States for education in 2021 enrolled at Community Colleges.

        Person responsible: Department Head with support from Enrollment Management and Strategic Communication Division of CCP

        Timeline: Fall 2023-Fall 2026

    3. **Promotional Opportunities:** Successful graduates are the program's best ambassadors. (See Appendix C) To enhance the recruitment of students into the Math A.S. curricula, the program should consider opportunities to share the stories and outcomes of program graduates with current and future students. The program hopes to collaborate with Enrollment Management and Strategic Communication to promote the success stories of our alumni and is proud to share a few comments from our alums here:

        - I transferred to Temple and got my BS in Mathematics with a CS minor in two years; then, I started the Ph.D. program at Temple in Computer Science. I finished my Ph.D. in Spring 2020. Currently, I am Senior Data Scientist at NMM in Philadelphia.
        - I am currently employed as the IT Manager in a non-profit organization. This year, I got accepted by the University of Pennsylvania for its MCIT master's degree program. I feel more and more that everything we covered in those (CCP) classes is a MUST, and how I was trained made a solid foundation for me!

- I wanted to thank you for believing in me at CCP and helping me with everything math and life-related. I am also applying to Ph.D. math education programs at Berkeley, Stanford, and Temple. I couldn't have done it without the help of you and CCP, and I really appreciate that.
- Attending community college can be a transformative experience, especially when encountering a professor who inspires and changes your life. That professor was my math instructor at community college; I had no prior math background and was intimidated by the subject. However, my instructor inspired me, taught me at a high level, and prepared me for my future academic and professional pursuits—currently Instructional Head Teaching Assistant at the University of Pennsylvania.

Person responsible: Department Head with support from Enrollment Management and Strategic Communication Division of CCP

Timeline: Fall 2023- Fall 2026

B. **Foundational Preparation:** Continue to assess the impact of FNMT 118 on success in MATH 162: Precalculus II and MATH 171: Calculus I. Underprepared students may be a contributing factor to issues observed in MATH 171's CSLO compliance. The performance gap has been improving; nevertheless, a watchful assessment will continue.

Person responsible: Department Head with select faculty support
Timeline: Fall 2023- Fall 2026

Course	FL 10 - SP 12			FL 12 - SP 14			FL 14 - SP 16			FL 16 - SP 18			FL 18 - SP 20			FL 20 - SP 22			Period
	Value	Change	Change%	Value	Change	Change%	Value	Change	Change%	Value	Change	Change%	Value	Change	Change%	Value	Change	Change%	
MATH 163	61.7%	—	—	50.3%	-11.5%	-18.6%	43.8%	-6.5%	-12.9%	46.5%	2.7%	6.3%	57.2%	10.7%	22.9%	56.3%	-0.9%	-1.6%	Success
	78.9%	—	—	70.3%	-8.6%	-10.9%	73.7%	3.5%	4.9%	60.0%	-13.7%	-18.6%	75.2%	15.2%	25.4%	73.4%	-1.8%	-2.4%	Complete
MATH 171	58.6%	—	—	58.6%	0.0%	0.1%	59.8%	1.2%	2.1%	62.7%	2.9%	4.9%	65.1%	2.3%	3.7%	79.4%	14.3%	22.1%	Success
	77.25%	—	—	77.65%	0.4%	0.5%	79.7%	2.0%	2.6%	82.5%	2.8%	3.6%	85.4%	2.8%	3.4%	88.0%	2.7%	3.1%	Complete

C. **Probability Course:** Stemming from student requests and optimizing student transfer opportunities, the program should finish developing MATH 252 with an eye toward an initial offering in Fall 2024. Concurrently, complete consideration of replacing one of three science electives with a probability course.

Person responsible: Department Head with select faculty support
Timeline: Fall 2023

D. **Faculty Hiring:** The Department should continue to explore hiring needs as the new Probability course and launch of the Applied Mathematics track/program are finalized.

Person responsible: Department Head with select faculty support
Timeline: Fall 2023 through Fall 2028

E. **Applied Mathematics:** A number of Math program students are interested in a joint math/computer science path; others seek to continue to a four-year math program. A few seek out a degree in Actuarial Science. Some of these graduates have expressed that the Math A.S. program, while the best program at the College for their goals, is not ideal. Conversations with these graduates have helped inform the department of their interest in an "applied math"

program that would provide a better two-year path for students interested in actuarial science among several other disciplines (e.g., statistics, bioinformatics, econometrics, etc.) If findings are supported, an Applied Mathematics A.S. degree should be developed to offer a better alternative for students interested in bioinformatics, mathematical economics, actuarial science, financial analysis, data science, statistics, and other applied mathematics majors. Once an Applied Math pathway is implemented, the program predicts an increase in enrollment.

Person responsible: Department Head with select faculty support
Timeline: Fall 2025

NARRATIVE

The study of mathematics emphasizes problem analysis, abstract thinking, and quantitative reasoning with critical thinking and the development of mathematical skills needed for expressing and understanding ideas in the sciences, engineering, and an increasing number of other fields. The Associate in Science degree in Mathematics at the College prepares students for transfer to a four-year college or university to complete a Baccalaureate degree in mathematics or a related field. In much the same way someone is attracted to be a musician or a priest, mathematics is more of a calling than a career. Students in the program typically find mathematics engaging, fascinating, and worthy of further study.

The Bureau of Labor Statistics (BLS) projects a 27% job growth rate for math-related occupations between 2019 and 2029, a rate much higher than the average for all occupations, 4%. Many fields now rely on data, which in part explains the high demand for skilled mathematicians, analysts, and statisticians. According to the BLS, math professionals earn a median annual salary of $90,410.

Enrollment in the Mathematics program between Fall 2017 and Fall 2022 is small but stable, with an average of sixteen students per semester. However, the data demonstrates consistency in strong outcomes:

 a. Mathematics program Fall to Spring retention, Returned to Same Program (71.4%), averaged 10 points higher than the College average (61.4%)
 b. Mathematics program Fall to Fall Percent Graduated (24.3%) was more than double the College average (11.0%)
 c. 56% of the Mathematics program graduates, whose first semester at CCP was between 2016-2020 and whose last CCP major was Mathematics, transferred
 d. The program shows exceptionally strong enrollment among minority male students

Actionable assessment has been a key to the strength of today's Math program; the benchmark for success is 80%. To meet this challenging goal, assessments are evaluated at the level, where the program identifies learning issues and issues are less visible when the data is aggregated to represent students' achievement of PLOs. The department reviews each assessment report and makes appropriate recommendations on a two-year cycle in accordance with the Department Assessment Plan.

Since the Mathematics Department is also the hub for upper-level mathematics education at the College, assessment results are communicated to all relevant Department Heads to ensure alignment between instruction and discipline requirements.

Also key is the program's readiness to participate in new teaching modalities such as the HyFlex classroom, making class meetings and materials available so students can access them online, in person, during or after class sessions. This Fall (2023), the College is introducing the HyFlex classroom; two Math faculty have volunteered to be part of the HyFlex team. Calculus I will be the first Math class offered in the program; a pre-calculus course is currently being offered as part of the pilot program.

The success of today's exceptional Math program at the College results from a committed and insightful faculty. CCP Math faculty are known and respected among the international community for their contributions to the field with regards to their research and scholarship and should be recognized for their dedication and accomplishments; see Appendix A.

Many Math graduates transfer to a four-year program. The program reaches out to those who complete a four-year degree for feedback about the efficacy of our program. We often receive information about what career opportunities their studies have successfully led to. The following are a few excerpts from Math program graduates; see Appendix B for extended comments and testimonials from program graduates.
- After finishing at CCP, I continued my studies towards a four-year degree at the University of Pennsylvania in mathematics and philosophy, graduating *cum laude*. Immediately after graduation, I moved to Austin, Texas, to take my current position as an entry-level actuarial analyst with one of the country's largest healthcare companies.
- I transferred to Temple and got my BS in Mathematics with a CS minor in two years; then I started the Ph.D. program at Temple in Computer Science. I finished my Ph.D. in Spring 2020. Currently, I am Senior Data Scientist at NMM in Philadelphia.
- I am currently employed as the IT Manager in a non-profit organization. This year, I got accepted by the University of Pennsylvania for its MCIT master's degree program. I feel more and more that everything we covered in those (CCP) classes is a MUST, and how I was trained made a solid foundation for me!
- I wanted to thank you for believing in me at CCP and helping me with everything math and life-related. I am also applying to Ph.D. math education programs at Berkeley, Stanford, and Temple. I couldn't have done it without the help of you and CCP, and I really appreciate that.
- From a personal experience, I really enjoyed the structure of the Mathematics Curriculum at CCP. The pace, the toughness of exams, and the unlimited amount of homework really prepared me for my career.
- Attending community college can be a transformative experience, especially when encountering a professor who inspires and changes your life. That professor was my math instructor at community college, I had no prior math background and was intimidated by the subject. However, my instructor inspired me, taught me at a high level, and prepared me for my future academic and professional pursuits—currently Instructional Head Teaching Assistant, the University of Pennsylvania.
- Even though I did not enjoy being constantly challenged by my professors DURING the semester, in retrospect, I could see that it made me a stronger student.

- I enjoyed my time at CCP. I was considered 'good' at math since high school, but I hadn't learned much about Math until coming to CCP. The curriculum at CCP helped me think critically about problems and how to approach problems and think about them logically. The professors were all very knowledgeable and subtly pushed students into thinking about concepts that would come up in later courses
- I'm grateful for the experiences I had in the classes at CCP; I could not have been better prepared to take classes at a four-year university. The classes I took at CCP inspired a respect and affection for math that I would not have otherwise developed (at least, I don't think I would have; the general attitudes are much different within the department at UVA).
- Although I have not chosen to pursue a degree in Mathematics or Engineering, I believe that my study of Mathematics at CCP has greatly enriched my academic experience. While it is true that the concepts have been useful, it is primarily the manner in which we are trained to think that has been the most beneficial.
- I'd like to thank you and the math department faculty for instilling in me a love of mathematics and incubating my skill in some of these areas of analytical thinking.

APPENDIX A: Summary of Faculty Scholarship and Commitment

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education
Atish Bagchi	30	Ph.D.	**Departmental Committees/Work** • Hiring & Personnel Committee, Fall 2018 to Summer 2020 • Co-developer of MATH 252: Probability Theory course proposal (in progress) **Continuing Education** • XXI Summer Diffiety School, Lizzano in Belvedere, Italy, July 19 – 31, 2018. The idea of Diffiety School is to continuously produce experts in a new area of Mathematics called Diffeotopy, who can cooperate in overcoming the long-resisting difficulties aroused by the crisis of the traditional approaches in facing problems linked with non-linear PDEs and the precise mathematical description of quantum phenomena.
Eleonora Chertok	20	M.S.	**CCP Workshops/Conferences** • FCTL Summer Institute: High Impact Practices, June 15, 2021 **CCP Presentations** • Arranged a presentation from AB Tutor for the Dean and the Department, January 9, 2020
Dorothy French	27	Ed.D.	**Departmental Committees/Work** • Department Head Selection Committee, Fall 2018, Spring 2021 • Liberal Studies Curriculum Committee, Fall 2013 to present **CCP Committees/Work** • Lindback Distinguished Teaching Award Divisional Committee, Fall 2019 – Spring 2021 **CCP Presentations** • Along with Dr. Clark Loveridge, "Encouraging Students with Threaded Discussions", Fall Professional Development Week, August 30, 2021
Ji Gao	32½	Ph.D.	**Departmental Committees/Work** • Calculus Curriculum Committee, Fall 2013 to present • Mathematics A.S. Program Advisory Committee, Fall 2013 to present • Department Head Selection Committee, Fall 2018, Spring 2021 • Hiring & Personnel Committee, Fall 2018 to Summer 2020 **Publications** • "Modulus of n-dimensional U-Convexity in Banach Spaces X and X^*", *Nonlinear Functional Analysis and Applications* Vol. 26, No. 2 (2021), pp.433-442. ISSN: 1229-1595 (print), 2466-0973 (online). • "Further Properties of 1- and 2-Dimensional U- and W-Convexity and Fixed Point of Non-expansive Mappings in Banach Spaces X and X^*", *Journal of Mathematics*. Published: 4 May 2021. • "Some Inequalities on w^{UR} Modulus of Convexity and Geometric Properties of Banach Spaces X and X^*", *Mathematical Inequalities & Applications*, Volume 22, Number 4, (2019), 1233-1241. • "Research on Normal Structure in a Banach Space via Some Parameters in its Dual Space", *Communications of the Korean Mathematical Society*, 34 (2019), No. 2, pp. 465-475.

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education

			• "Modulus of 2-dimensional *U*-Convexity and the Geometry of Banach Spaces", *Journal of Nonlinear and Convex Analysis*, Volume 20, Number 10, 2041-2051, 2019.
			• "w^{UR} Modulus and Normal Structure in Banach Spaces", *Advances in Operator Theory*, Vol. 3, 3(2018), pp. 639-646.
			• "The Introduction of New Modulus $\zeta_{X(\varepsilon)}$, Uniform Non-Squareness and Uniform Normal Structure in Banach Spaces", *Romanian Journal of Pure and Applied Mathematics*, Vol. LXIII (2018), No.1, pp. 49-61.
			Presentations
			• "The Fixed Points of Non-Expansive Mappings and Some Geometric Parameters in Banach Spaces." The 2nd JNMP Conference on Nonlinear Mathematical Physics. University of Santiago, Chile. May 26 to June 4, 2019
			• "Research on Normal Structure in a Banach Space via Some Parameters in its Dual Space," Operator Theory Analysis and Mathematical Physics 2020 Universidad Nacional Autonoma de Mexico Instituto de Investigaciones en Matematicas Aplicadas y en Sistemas, 8-14 January 2020.
			Memberships/Positions
			• Member of American Mathematical Society
			• Editor of the following Journals:
			    o *The Journal of Mathematics.*
			    o *The Journal of Dynamic Systems and Geometrical Theories.*
			    o *The WSEAS Transactions on Mathematics.*
			    o *The Journal of Statistics and Mathematical Sciences.*

Stephen Gramlich	18	Ph.D.	Departmental Committees/Work • Department Head Selection Committee, Fall 2018, Spring 2021 • Hiring & Personnel Committee, 2019 – 2020 CCP Student Support • Academic Advisor, Fall 2011 (possibly earlier) to present
Reid Huntsinger	16½	Ph.D.	Departmental Committees/Work • Precalculus Curriculum Committee, Fall 2013 to present • Calculus Curriculum Committee, Fall 2013 to present • Probability & Discrete Mathematics Curriculum Committee, Fall 2013 to present • Statistics Curriculum Committee, Fall 2013 to present • Hiring & Personnel Committee, Fall 2018 to Summer 2020 CCP Student Support • CCP Math Club Faculty Advisor, Fall 2019 to Summer 2020
John Jernigan	23½	M.A.	Departmental Committees/Work • Mathematics Awards Committee, 2019 – 2020
Arkady Kitover	31½	Ph.D.	Departmental Committees/Work • Calculus Curriculum Committee, Fall 2013 to present • Mathematics A.S. Program Advisory Committee, Publications • With Orhon, M. "Spectrum of weighted composition operators part VIII lower semi-Fredholm spectrum of weighted composition operators on C(K). The case of non-invertible surjections". Positivity 26, 80 (2022). (https://doi.org/10.1007/s11117-022-00934-w)

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education
			Memberships/Positions • Reviewer, Mathematical Reviews (submitted three reviews) • Editor, Positivity (edited about 20 papers)
Clark Loveridge	22	Ph.D.	Departmental Committees/Work • Liberal Studies Curriculum Committee, Fall 2013 to present • Statistics Curriculum Committee, Fall 2013 to present CCP Committees/Work • Lindback Distinguished Teaching Award Divisional Committee, Fall 2018 – Spring 2019 • Member, Advisory Board for the CCP Faculty Center for Teaching and Learning, Fall 2015 – Summer 2021 • Coordinator, CCP Math/Science Divisional Travel Fund, Fall 2016 to present • HyFlex Pilot Committee, Summer 2022 to present CCP Workshops/Conferences • FCTL Summer Institute: High Impact Practices, June 15, 2021 • Summer Equity Institute, June 7 – 9, 2022 • Quality Matters, September 1 – 2, 2022 CCP Presentations • Along with Dr. Dorothy French, "Encouraging Students with Threaded Discussions", Fall Professional Development Week, August 30, 2021 • Along with Melissa Altman-Traub and Carla Perry, "What Will HyFlex Look Like at CCP?" Spring Professional Development Week, January 11, 2023 Conferences • Minicourse in Open Educational Resources, July 18 – 29, 2022 (www.affordablelearningpa.org) • Mathematics Association of America Meeting, August 3 – 6, 2022 Achievements/Credentials • Completed a third Masters degree (in Education), Capella University, 2020 Memberships/Positions • Mathematical Association of America (www.maa.org) • National Council of Teachers of Mathematics (www.nctm.org)
Camille Mairs	38	M.S.	Departmental Committees/Work • Precalculus Curriculum Committee, Fall 2013 to present • Statistics Curriculum Committee, Fall 2013 to present CCP Committees/Work • HyFlex Pilot Committee, Summer 2022 to present

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education
Issac Pesenson	20½	Ph.D.	**Departmental Committees/Work** • Calculus Curriculum Committee, Fall 2013 to present **Publications (Papers)** • "Shannon sampling and weak Weyl's law on compact Riemannian manifolds." *Analysis and partial differential equations: perspectives from developing countries*, 207–218, Springer Proc. Math. Stat., 275, Springer, Cham, 2019. • "A weak Weyl's law on compact metric measure spaces." *J. Pseudo-Differ. Oper*. Appl. 11 (2020), no. 4, 1447–1463. • With Pesenson, Meyer Z. "Graph signal sampling and interpolation based on clusters and averages." *J. Fourier Anal. Appl.* 27 (2021), no. 3, Paper No. 39, 28 pp. • With Steinerberger, Stefan; Sun, Qiyu "Overview of the topical collection: harmonic analysis on combinatorial graphs." *J. Fourier Anal. Appl.* 28 (2022), no. 2, Paper No. 22, 17 pp. • "Sampling and interpolation for the discrete Hilbert and Kak–Hilbert transforms," *Journal: Canadian Mathematical Bulletin*, Published online by Cambridge University Press: 07 March 2022, pp. 1-16 (https://www.cambridge.org/core/journals/canadian-mathematical-bulletin/article/abs/sampling-and-interpolation-for-the-discrete-hilbert-and-kakhilbert-transforms/4DCC88260CA9D33EAC52EDBA7B98FA2F) • "Jackson-Type Inequality in Hilbert Spaces and on Homogeneous Manifolds," *Analysis Mathematica*, Published online: 14 September 2022 (https://link.springer.com/article/10.1007/s10476-022-0176-0) • "To Multidimensional Mellin Analysis: Besov Spaces, K-Functor, Approximations, Frames", will appear in the journal *Sampling Theory, Signal Processing, Data Analysis*, Springer, 2023. • With Meyer Z. Pesenson, Hartmut Fu¨hr, "Quadrature Formulas on Graphs", will appear in the journal *Sampling Theory, Signal Processing, Data Analysis*, Springer, 2023. **Publications (Chapters)** • "Sobolev, Besov and Paley-Wiener vectors in Banach and Hilbert spaces." *Functional analysis and geometry: Selim Grigorievich Krein centennial*, 251–272, Contemp. Math., 733, Amer. Math. Soc., [Providence], RI, [2019], ©2019. • "Sampling by averages and average splines on Dirichlet spaces and on combinatorial graphs. Excursions in harmonic analysis. Vol. 6"—in honor of John Benedetto's 80th birthday, 243–268, *Appl. Numer. Harmon. Anal.,* Birkhäuser/Springer, Cham, [2021], ©2021. • "Bernstein spaces, sampling, and Riesz-Boas interpolation formulas in Mellin Analysis", will appear in the volume dedicated to Prof R.Higgins "Sampling, Approximation, and Signal Analysis", *Appl. Numer. Harmon. Anal.,* Birkhäuser/Springer, Cham, 2023. **Presentations** • "Poincaré and Plancherel-Polya-type inequalities in harmonic analysis on weighted combinatorial graphs." American Mathematical Society Meeting

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education

			at Delaware University, September 29, 2018, (http://www.ams.org/meetings/sectional/2256_program_ss5.html#title
			• "Shannon sampling on manifolds and graphs". Israel, Bar-Ilan university, Analysis Seminar, 05/20/2019, (https://math.biu.ac.il/node/857)
			• "Signal Sampling and Interpolation on Community Graphs". Austria, Applied Harmonic Analysis and Friends, June 19th - 25th 2022 Strobl, (https://ps-mathematik.univie.ac.at/e/index.php?event=strobl22&page=participants)
			• "Graph signal sampling and interpolation." Canada, Toronto, The Fields Institute for research in Mathematical Science, Monday, June 6, 2022 - 2:00pm to 2:50pm (http://www.fields.utoronto.ca/talks/Graph-signal-sampling-and-interpolation-based-clusters-and-averages)
			• "Signal sampling by averages on Dirichlet spaces," Canada, Toronto, The Fields Institute for research in Mathematical Science, Thursday, May 19, 2022 - 3:00pm to 3:30pm, (http://www.fields.utoronto.ca/talks/Signal-sampling-averages-Dirichlet-spaces)
			Memberships/Positions
			• Special Session organizer: France, Bordeaux University, July 8-12. International Conference SAMPTA- 2019, (https://sampta2019.sciencesconf.org/)
			• Board Member: *Journal of Fourier Analysis and Applications. (*https://www.springer.com/journal/41/editors)
			• Reviewer Ad Hoc for the following international journals 2016-present:
			    ○ *Journal of Functional Analysis,*
			    ○ *Journal of Geometric Analysis,*
			    ○ *Journal of Approximation Theory,*
			    ○ *Journal of Mathematical Analysis and Applications, Applied and Computational Harmonic Analysis.*

Brenton Webber	24½	M.A.	Departmental Committees/Work • Assessment & Compliance Committee, Fall 2011 to present • Probability & Discrete Mathematics Committee, Fall 2013 to present • Mathematics A.S. Program Advisory Committee, Fall 2013 to present • Mathematics Awards Committee, Fall 2015 to present • Co-developer of MATH 252: Probability Theory course proposal (in progress) CCP Committees/Work • Department Head Council (Chair), Fall 2011 to present • Science & Technology Academic Pathway Committee, Fall 2016 to present • Cross Divisional Curriculum Planning Committee, Summer 2017 – Summer 2019 • CCP Representative for Mathematics, Pennsylvania Department of Education Transfer Articulation Oversight Committee Credit for Prior Learning Workgroup, Mathematics (Co-Chair), Fall 2018 to present • General Education Task Force, Summer 2019 to present • General Education Essential Skills Committee, Fall 2022 to present • Academic Affairs Curriculum Subcommittee, Fall 2019 to present • Assessment Platform Review Team, Spring 2023 to present

Instructor Name	Years of Service (as of Dec. 2022)	Highest Credential	Summary of Recent Notable Department Activities, Research Publications, and Continuing Education

			CCP Presentations
			• Panelist, "Where Are We with General Education?" Fall Professional Development Week, August 27, 2019
			• Mathematics Summer Seminar:
			   o "Analysis," 7 sessions, May – June 2019
			   o "Abstract Algebra," 6 sessions, May – June 2020
			   o "Probability," 6 sessions, May – June 2022

Margaret Wojcicka-Hitczenko	27½	Ph.D.	Departmental Committees/Work • Mathematics Awards Committee, 2019- 2020, 2020-2021, 2021- 2022
Yum Yoo	16½	Ph.D.	Departmental Committees/Work • Calculus Curriculum Committee, Fall 2018 to present • Statistics Curriculum Committee, Fall 2013 to present • Mathematics Award Committee, Fall 2022 to present CCP Committees/Work • Lindback Distinguished Teaching Award Divisional Committee, Fall 2021 to present • Academic Affairs Academic Support Subcommittee, Fall 2022 to present • Technology Coordinating Committee, Fall 2022 to present • HyFlex Pilot Committee, Fall 2022 to present • Panelist, STEM and Health Care Alumni Event, October 2022 • Surveyor, STEM and Health Care Alumni Event, Fall 2022, Spring 2023 CCP Student Support • Helped students with Discretionary Funds, CCP Emergency Funds, and Fast Funds, Fall 2022 • Service-Learning RSVP Volunteering Math Tutoring 2022-2023 Publications • With B. Boyer "Unitary Representations of Infinite Wreath Products," *Annals of Functional Analysis* Volume 10, Number 1, 97-105, 2019 Conferences • Fierce Education: Business & Leadership, June 30, 2022 • Course Hero's Education Summit, July 28-29, 2022 • The Complete Mathematics Conference, August 19, 2022 Memberships/Positions • Mathematical Association of America, 2022 to present Awards • CCP STEM Health Care Alumni Award 2022 • Monthly Experiential Learning Updates, Nov/Dec 2022 Certifications • Certification for Title IX for Higher Education, November 2022 • Certification for Harassment Prevention for US Managers, November 2022

APPENDIX B: Student Voice, Summary of Survey Responses, and Student Correspondence

Almost all math graduates transfer to a four-year program. The program reaches out to those who complete a four-year degree for feedback about the efficacy of our program. We often receive information about what career opportunities their studies have successfully led to. The following are comments from recent graduates. Prompts include:
- Current/Recent Institution Affiliation
- Please indicate your reasons for pursuing your current transfer degree.
- What, in your opinion, are the strengths of the AS program in Mathematics?
- What, in your opinion, are the weaknesses of the AS Program in Mathematics?
- Comment about your experience in the Mathematics Curriculum at CCP

Academic History	Comments (Some comments edited for clarity)
• CCP Math Program 2013 – 2015 • Recipient of the Mathematics Department Achievement Award 2015 • Mills College graduate 2017, Masters in Math Secondary Education; currently enrolled in an Ed.D. program at the University of Pennsylvania	Comment 1: I just wanted to let you know I am officially graduating with my BA in mathematics from Mills College next week. I wanted to thank you for believing in me at CCP and helping me with everything math and life related. I come back to Mills in the fall to finish my masters in math secondary education (I did the 4+1 program here). I am also in the process of applying to PhD programs in math education at Berkeley and Stanford and Temple. I couldn't have done it without the help of you and CCP and I really appreciate that.
• CCP Math graduate 2019 • Recipient of the Mathematics Department Achievement Award 2018 • Temple graduate 2021, Bachelor in Business Administration, Actuarial Science Option	Comment 1: Enrolled in CCP Mathematics To have strong fundamentals and bases pursuing my Actuarial Career Comment 2: Program Strengths First an AS in mathematics give you opportunity to transfer to a 4-year college and pursue any path you want. Second, the background in math muscle your brain and prepare you to approach any situation with more common sense or logic, rational and confidence. Comment 3: Program Weakness From my experience not much maybe include more statistics courses Comment 4: From a personal experience I really enjoyed the structure of Mathematics Curriculum at CCP. The pace, the toughness of exams and an unlimited amount of homework's really prepare me for my career. Also, with most professor using chalk on black board. The traditional structure of teaching had a positive Psychological effect on me. I am not sure I would have said the same if I was still student at CCP during the pandemic. Great experience overall
• Computer Science graduate 2019 • University of Pennsylvania MCIT expected 2023	Comment 1: Currently Instructional Head Teaching Assistant, University of Pennsylvania Comment 2: Attending community college can be a transformative experience, especially when encountering a professor who inspires and changes your life. For me, that professor was my math instructor at community college, and I had no prior math background and was intimidated by the subject. However, my instructor inspired me, taught me at a high level, and prepared me for my future academic and professional pursuits. Before taking my instructor's course, I struggled with math. I had always been intimidated by the subject and had never excelled in math classes. However, my instructor's teaching style was different. They were patient, kind, and encouraging. They made complex mathematical concepts understandable and helped me see math's beauty and importance. Under my instructor's guidance, I not only learned math, but I also learned how to approach challenges with a growth mindset. I became more confident in my ability to learn and

Academic History	Comments (Some comments edited for clarity)
	succeed. This newfound confidence led me to apply to a prestigious university, and I was thrilled to be accepted.
	At university, I continued to excel in math and computer science. In my third semester, I had the opportunity to take on a leadership role as a TA for a computing and algorithm course. This position gave me the opportunity to teach and mentor other students, just as my instructor had done for me.
	Looking back, I can't imagine where I would be without the math courses and my instructor at community college. They changed the course of my academic and professional trajectory, and they inspired me to pursue my passions with confidence and enthusiasm. I will always be grateful for their guidance and support.
	In conclusion, community college can be a transformative experience for students, and dedicated instructors can tremendously impact their students' lives. The math program at CCP is an excellent example of the quality education that community colleges can provide. I hope this experience serves as a testament to the value that community colleges can offer students.
• CCP Math graduate 2019 • Université Claude Bernard, Lyon, France graduate, BS Actuarial Science 2021, currently a doctoral student in Actuarial Science at the Université Lausanne, Lausanne, Switzerland	Comment 1 Mathematics is the basis of actuarial science, which I am passionate about. To become an actuary, one needs strong mathematical foundations. Comment 2 The AS program in mathematics introduces one (and does so well) to classic mathematics fields like linear algebra, calculus, and differential equations but the real appeal of the AS program are the discrete mathematics courses, as they introduce you to the logic behind mathematical reasoning. Comment 3 The AS program lacks an actuarial track to prepare students for actuary-related studies and, in particular actuarial exams (FM and P). Take-home exams are good, but in-class exams test the student's capabilities and understanding better. Of course, students need enough time to prepare for the exams, especially for finals; that is generally not the case. Comment 4 Adding an actuarial track to the AS program in Mathematics More in-person exams (or timed exams if online) Train the current academic advisors on directing students to the right mathematical courses for their career aspirations or hire advisors who can guide young students. Comment 5 My experience in the Mathematics Curriculum at CCP was a success. The math department at CCP has a lot of enriching classes. However, one's real abilities are not really tested as they should be. Also, please do communicate with the academic advisors; they can misguide students, especially about mathematics-related careers.
• Computer Science graduate 2019	Comment 1 After being fairly involved in the Mathematics program and community at CCP, I also became pretty integrated in the Rutgers Math community. I went from tutoring and running regular recitations in the Learning Lab to grading, tutoring, and Taking at Rutgers. I have experience tutoring CCP students in all math courses from 152 to 272 and students from many other community colleges in those same core courses. I have even interacted with and befriended course coordinators and professors at Rutgers, whose main focus is on introductory material presented to thousands of students. I have both developed and coordinated curricula for supplementary mathematics education as well. Comment 2 The classes taught and managed are more than enough to transfer back to a 4-Year institution. From my estimation, it is better than most of the anecdotal Community College results I have discussed with members of the Rutgers Mathematics Department. My perspective as a high-achieving student might be slightly skewed, but it is no secret that most of my cohort has done exceedingly well after graduation. I consider myself as much a product of the material and motivation presented in the mathematics department at CCP as I am my own interests.
• CCP Math graduate 2018	Comment 1

Academic History	Comments (Some comments edited for clarity)
• Temple graduate 2022, Bachelor in Business Administration, Actuarial Science Option	I planned transfer to Temple University upon completion of AS to major in actuarial science. Mathematics was far more helpful in preparing me than the AS in Business pathway recommended to me by the counsellors at CCP Comment 2: Program Strengths The independence of the teachers. Even though I did not enjoy being constantly challenged by my professors DURING the semester, in retrospect I could see that it made me a stronger student. Comment 3: Program Weakness Limited course offerings. I understand why the math courses are limited in selection, but it would be nice to have taken a class in probability and financial mathematics. Comment 4: Even though discrete mathematics did not count towards my graduation requirements after transferring to Temple, I consider it one of the most valuable courses that I have taken. The logic and study habits taught in this course completely transformed how I view being a student and how I approach mathematics. I wish that there was an option to skip differential equations if you are not going to be an engineering student. To be frank, I found that class to be a complete waste of time.
• CCP Computer Science Graduate 2017 • CCP Math Graduate 2018 • Temple University graduate 2020, Bachelors in Mathematics	Comment 1: I wanted to learn more math than what was required in the CS degree. Comment 2: The rigor of coursework and knowledge of professors. Also the small class size. Comment 3: Math 251 it's pretty useless both for personal enrichment and transferring to other universities Comment 4 I enjoyed my time at CCP. I was considered 'good' at math since high school, but I haven't learned much about Math until coming to CCP. The curriculum at CCP helped me thinking critically about problems and how to approach problems and think about them logically. The professors were all very knowledgeable and subtly pushed students into thinking about concepts that would come up in alter courses. If I could redo my academic career, I'd start at CCP to better learn Math as opposed to going to a 4-year school right away or even look into taking night classes during high school.
• Dual-enrollment high school student • CCP Math Program 2016-2018 • University of Virginia graduate 2022, BS in Mathematics, BS in Astronomy	Comment 1: • I attended CCP concurrently with my high school, so I was not able to fully commit to attending CCP; moreover, I was given the opportunity to attend a four-year University on a scholarship, which took precedence. Comment 2: • The math classes at CCP are rigorous enough to have prepared me for math classes at a four-year University. Professors within the department employ various pedagogies, which allows students to choose professors whose methods and expectations align well with their learning style. Comment 3: • I'm grateful for the experiences I had in the classes at CCP; I could not have been better prepared to take classes at a four-year University. The classes I took at CCP inspired a respect and affection for math that I would not have otherwise developed (at least, I don't think I would have; the general attitudes are much different within the department at UVA). • I understood from the classes at CCP that studying math requires a cleverness that is not contingent on a student's ability to perform numeric computations as quickly as possible. I felt that my classes emphasized the importance of thorough and logically consistent arguments, and this approach allowed mathematics to be both accessible and interesting to me. I have not experienced a similar attitude yet within the department at the University of Virginia; I consider it a failure of the department.
• CCP Math graduate 2018 • Temple University graduate 2020, BS in Electrical Engineering with a	Comment 1: • It fulfilled more of the requirements for the computer engineering track than the AS in Engineering.

Academic History	Comments (Some comments edited for clarity)
concentration in computer engineering	• Something I learned in my introduction to engineering class was that engineers use physics as a tool and physicists use mathematics as a tool, so engineers use mathematics as a tool. I wanted to know more about the tools I would be using than just how to use them. Comment 2: Program Strengths • Taking linear algebra before calc III and diff eq setup made those two courses make a lot more sense than they would have otherwise. • Taking two semesters of computer programming was a good application of concepts learned in discrete math I & II. • The courses I took were well-structured, well-paced, and taught by professors who were passionate about the subjects. • Critical thinking and proofs were stressed in some way or another. The classes were not just regurgitating material from textbooks and packets. Comment 3: Program Weakness • My diff eq class did not cover many of the standard application problems found in other diff eq courses. Comment 4: • It felt like the material presented across all of the courses was one coherent body of knowledge instead of just a collection of courses. • I learned a notation style that put a word or phrase to every symbol I was writing. The changed in my internal dialog was like going from thinking in sentence fragments to full paragraphs. This makes understanding and solving problems in other courses (like physics and chemistry) much more coherent.
• CCP Math program 2012-2015 • Transferred to Temple 2016	Comment 1: • rewarding; curiosity; ability to understand concepts in other fields (finance/gambling) Comment 2, Program Strengths: • Dealing with abstraction; problem solving skills; thinking logically; develops rigor in thinking; makes other science classes easier; stating problems in a precise way; dealing with patterns
• CCP Math program 2014-2017 • Thomas Jefferson University – College of Health Professionals	• Although I have not chosen to pursue a degree in Mathematics or Engineering, I believe that my study of Mathematics at CCP has greatly enriched my academic experience. While it is true that the concepts have been useful, it is primarily the manner in which we are trained to think that has been the most beneficial. To date, I have not earned less than an "A" in any class other than Calculus I and Calculus II. • These classes pushed me academically further than I had imagined possible.
• CCP Engineer Science Program graduate 2017 • Recipient of the James P. Diskin Scholarship 2017 • Temple University graduate 2019, BS in Mechanical Engineering	Comment 1: • During my second year at CCP, I was encouraged to pursue an AS in Mathematics in addition to Engineering. I was lacking only three courses in addition to my engineering coursework. Shortly before the beginning of the Fall 2016 semester, CSCI 112 was cancelled, and no additional section offered in which I could enroll, given my schedule. For this reason, I chose to forgo the Mathematics AS to prioritize completion of the Engineering AS. Comment 2, Program Strengths: • I found the level of abstraction at which mathematics is discussed, particularly in MATH 270 and above, to be extremely helpful in understanding other mathematical and physical topics, as well as other complex topics in general. Additionally, instilling an intuition for logic and deductive reasoning was extremely useful. I also felt an intrinsic interest in learning the mathematics which would help me better understand my personal interest in fundamental physics, which I largely understood only at a popular level. Comment 3, Program Weaknesses: • There is some inconsistency with which the abstraction which characterizes mathematics is taught and stressed. While in many cases it was instructive to work with concrete examples, I feel that beginning with the concrete makes it that much harder to grasp abstraction. As an engineering student, I certainly appreciate the applications of mathematics, but I believe that it allows a more natural application to diverse topics when the abstract knowledge is taken to be the base, rather than the reverse. Comment 4:

Academic History	Comments (Some comments edited for clarity)
	• I would have appreciated exposure to modern mathematical notation and abstractions earlier in the coursework. It seems that, while still common, classical notation has clear and significant ambiguities which can be avoided with sufficient precision. In the same way that engineering education is compelled to adapt to recent advances in the field, I believe it would be beneficial for the mathematics education to do the same.
• CCP Math graduate 2013 • Recipient of the James P. Diskin Scholarship 2013 • University of Pennsylvania, graduate 2020, Bachelors in Philosophy and Mathematics	Comment 1: • Working in Austin, Texas as an actuarial analyst Comment 2: • career actuaries are required to sit for a series of five preliminary exams that cover a broad range of topics and rely heavily upon a command of basic probability, combinatorics, and statistics. All of this is fun and challenging for me, and a great continuation of the basic training I received at CCP. Comment 3: • I'd like to thank you and the math department faculty for instilling in me a love of mathematics and for incubating my skill in some of these particular areas analytical thinking.

Additional Student Feedback

FALL 2020

Hi! My name is Haomin Tian, a former CCP student. I am currently full-time employed as the IT Manager in a non-profit organization. I am also pursuing a career change from IT support and project management to software engineering. This year, I got accepted by the University of Pennsylvania for its MCIT master's degree program.
I took 163(Discrete Math 1), 263(Discrete Math 2), 270(Linear Algebra) with Professor Bagchi. The best things I encountered at CCP were, (1) my passion of my career - coding and programming. (2) Math 163 (Discrete I), Math 263 (Discrete II), and Math 270 (Linear Algebra). My concentration was in networking and network security, until one semester, I took a programming class and a math class. The only professor who taught discrete mathematics was Professor Bagchi. Unlike any other math teachers, I had in CCP, he requires us to write all the answers in math language and in a particular way. He challenges us to think in every possible way. At the beginning, I was stressed and feeling lost. But as time went on, by following those strict rules and facing those tough challenges, things started to get clearer and clearer. And eventually I realized why those rules are so important and why Professor Bagchi gave us those challenges. I started to see the beauty of math.

I expected to get an A to make my GPA look good. But Professor Bagchi brought me into the math world. I truly benefited from the knowledge I learned in the class. Because the mathematics of modern computer science is built almost entirely on discrete math, in particular combinatorics and graph theory. This means that in order to learn the fundamental algorithms in computer science, we need solid background in these subjects. It is 163 and 263 are easy to understand why they 163 and 263 are important to computer science. Concept of sets, binary relations, logic, binomial coefficient, counting, recursion, graph theory are all etc. All those content are fundamental of to computer science. 270(Linear Algebra) is actually very beneficial too, especially to people who is are Computer Science majors. It helps me in understanding graphics, image processing and searching algorithms.
Just before I started to write, I was trying to solve an algorithm on LeetCode. It is related to binary trees, Bagchi's notes about the rooted tree pop up in my mind immediately, also the tree we drew in class, the algorithm we used in class all appeared. The problem only took me about 2 minutes! As the algorithms get more and more difficult and complicated, I feel more and more that everything we covered in those classes is a MUST and the way I was trained made a solid foundation for me! I cannot recommend enough all Bagchi's math classes for you. They might be a little bit challenging, but all efforts will be paid off!

— Haomin Tian, CCP Computer Information Systems A.A.S. 2017

FALL 2021

Professor Bagchi asked me to give my thoughts about why taking Discrete 2 will be very helpful to you in your career, and direct my thoughts toward Computer Science students (since Mathematics majors have to take it regardless!).

My background: I got my Associate's degree at CCP where Professor Bagchi encouraged me to take some CS courses, although my interest was in Mathematics at the time (and Linguistics but talking about that would take me-too far-off course here). I transferred to Temple and got my BS in Mathematics with a CS minor in two years, then I started the PhD program at Temple in Computer Science. I suppose I switched to CS because I saw more opportunity there for me than in Math: the career opportunities that would be open to me, but also the opportunity for me to contribute something meaningful. I finished my PhD in Spring 2020. Currently I am Senior Data Scientist at NMM in Philadelphia.

An argument for graph theory - problem solving: The primary problem-solving technique in CS is converting the problem you are given into a problem type you are familiar with. Foremost among these are graph type problems. For example, how do you find the shortest route across town? This is easily converted into a graph theory problem where nodes represent intersections and destinations and directed edges represent connections between them, on which we can apply one of several well-known traversal algorithms. [Check out Dijkstra's algorithm on Wikipedia]

We can better understand problems by thinking of them as graph problems, for example, searching a sorted array is conceptually the same as descending a binary search tree. Data structures such as min/max heaps can be more easily understood by thinking of them as partially ordered trees. Understanding graph theory gives us a set of tools to help solve a wide variety of problems.

An argument for graph theory - getting a job: I have interviewed at Google, Amazon, Microsoft, Meta/FB, Bloomberg, and many smaller companies, and in every single interview I have been asked questions about graph theory problems, recurrence problems, and expected runtimes. Knowing how to answer these questions requires being familiar with the theory they depend on. For many job openings, solving problems like these is the first step before you even talk to anyone. [Check out leetcode to see what many of these first-round interview questions are like] What's more, most smaller companies have followed the big tech companies in their interview designs. What this generally means is that for a type of CS job, particularly when you are starting out, it is necessary to convince your prospective employers that you have a solid understanding of the foundational material, and graph theory is at the top of the list here.

— Andrew Schneider, CCP Mathematics A.S. 2012

FALL 2022

My name is Chris, a now Rutgers-NB graduate in Math & CS, a soon-to-be software engineer with a top tier tech company next February, and a former 163 student of Professor Bagchi. In fact, I was a tutor for 163 for a number of years, and it is possible you've read other propaganda blurbs I've done in the past. This one will be similar, but I also have a little bit more experience to add to my perspective.

Though 163 was challenging, this type of math is more standard to mathematics as experienced in the wild. It's removed quite a bit from the cookie-cutter calculations you might recognize from other coursework. The art is almost exclusively about applying definitions to solve problems and prove conjectures. It is the first part of that which I would like to touch on.

You may think that you will never see this material again, but it will be embedded in almost every course you take involving discrete math. That includes all CS courses as well as many things in the realm of engineering and

statistics. These concepts don't go away, and having a better understanding of them will make your other classes feel much easier. You will also see yourself slowly morph into a much better problem solver.
Now, since space and attention are luxuries I will omit an exhaustive list of where everything in 163 is used. BUT! It is with that idea that I urge you to also take 263.

It was my favorite course at CCP, and from there I went on to take five more courses focusing on Discrete Math including three at the PhD level. Perhaps you're not interested in taking things that far, which is fine, but I can't think of a CS class beyond the introductory course where graphs did not come up.
The backbone of 263 is of course graph theory, and the uses for this subject are immense. In fact, a heavy part of my job will involve cloud architecture of objects connected in a graph. I cannot stress enough that the myth that you do not use math in your day to day work life is false. All of these concepts underpin everything you will do in your career. The people that cannot see them just do not know any better without the background to recognize them.

I will leave you with this last idea. Most of the mathematics courses I took were challenging, frustrating, and difficult. Many were also rewarding and fun. 263 was among the most fun. Moreover, once I had taken all of the math courses I wanted I went back to CS coursework only to realize it was effectively trivial. The hard part of most technical curricula is math. Learning that first and going back will make your life much easier. You don't need to know what this relates to now, but optimal pathfinding algorithms in an AI class go so much smoother when you already know what a metric is, how to count combinatorially, know algorithms for efficient data storage, know how to utilize recursion, and know how to traverse a graph. All of these things are from math classes, and other than metrics, they're all from 163 and 263.
Best of luck.

— Chris Shafer, CCP Computer Science A.S. 2019, James P. Diskin Scholarship Recipient 2019

Community College *of* Philadelphia

Academic Program Review:
Liberal Arts (LART) A.A.

Authors: John Joyce, Dawn Sinnott, Ph.D.
Spring 2023

Table of Contents

Executive Summary

Key Findings

Enrollment

1. Average enrollment in the Liberal Arts Program between Fall 2017 and Fall 2022 was 1,617 students per semester; see Exhibit 1.

Exhibit 1: College and Liberal Arts Enrollment												
	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Average
College-Wide	17,296	16,503	16,671	15,544	15,996	14,789	13,673	12,195	11,647	10,431	11,636	14,216
Liberal Studies	2,118	1,935	2,161	1,928	1,952	1,686	1,453	1,333	1,180	1,039	987	1,617

2. Demographics
    a. Liberal Arts (LART) average full-time enrollment (37.1%) is higher than the college average (29.1%); see Exhibit 2a.
    b. Enrollment by Gender and Race/Ethnicity; see Exhibit 2b.
        *   The Liberal Arts program reflects the college demographics; there are no notable differences.
    c. On average, LART students were more likely to be between 16 to 21 years of age than the college-wide average; LART 55% and College 43%; see Exhibit 2c.
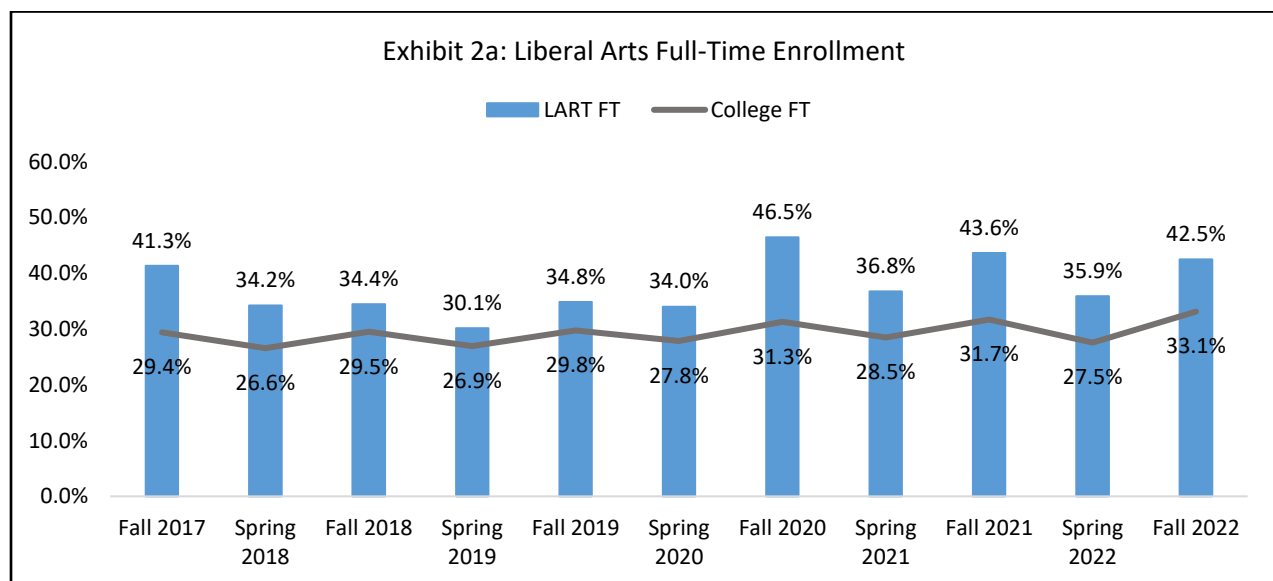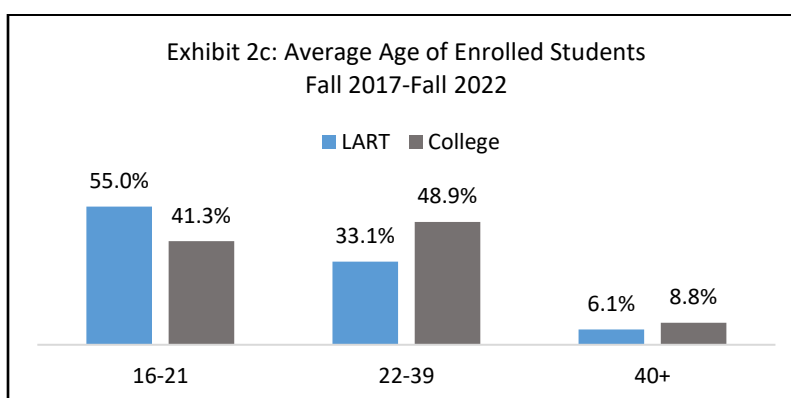

Exhibit 2a: Liberal Arts Full-Time Enrollment

Exhibit 2b: Gender and Ethnicity by Liberal Arts Majors *												
LART		Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	LART Average	College Average
Asian	Female	5%	5%	5%	5%	4%	4%	5%	5%	5%	5%	5%	6%
Asian	Male	5%	5%	5%	5%	6%	5%	4%	4%	4%	4%	5%	5%
Black	Female	24%	24%	24%	23%	25%	26%	25%	28%	31%	32%	26%	30%
Black	Male	19%	20%	18%	19%	17%	16%	15%	16%	17%	16%	17%	13%
Hispanic	Female	9%	8%	9%	9%	11%	10%	12%	11%	10%	11%	10%	11%
Hispanic	Male	7%	7%	7%	6%	7%	6%	6%	6%	7%	7%	7%	5%
White	Female	12%	13%	13%	13%	12%	13%	13%	11%	11%	11%	12%	14%
White	Male	11%	10%	10%	9%	9%	10%	8%	8%	8%	8%	9%	8%
											Female	53%	61%
											Male	38%	31%
* Missing and unknown data is excluded													

Exhibit 2c: Average Age of Enrolled Students Fall 2017-Fall 2022

■ LART ■ College

	16-21	22-39	40+
LART	55.0%	33.1%	6.1%
College	41.3%	48.9%	8.8%

Retention – Returned or Graduated
3. Fall to Spring Retention
   a. Between Fall 2017 and Fall 2021, the LART program's Fall to Spring retention, Returned to Same Program, averaged 5 points lower than the College average; see Exhibit 3a.
   b. On average, 58.4% of LART students returned to the same program or graduated, while 64.6% of students College-wide returned to the same program or graduated; see Exhibit 3b.

Exhibit 3a: Fall to Spring Retention							
LART	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	LART Average	College Average
Headcount	2,118	2,161	1,952	1,453	1,180	1,773	15,056
Returned to Same Program	60.5%	58.5%	58.0%	59.2%	59.3%	59.1%	61.4%
Returned to Different Program	11.2%	7.6%	8.6%	8.5%	7.0%	8.7%	4.2%
Graduated	1.6%	1.4%	2.6%	2.0%	2.0%	1.9%	3.2%
Did Not Persist	26.7%	32.5%	30.8%	30.4%	31.6%	30.3%	31.3%

Exhibit 3b: Fall to Spring Returned or Graduated
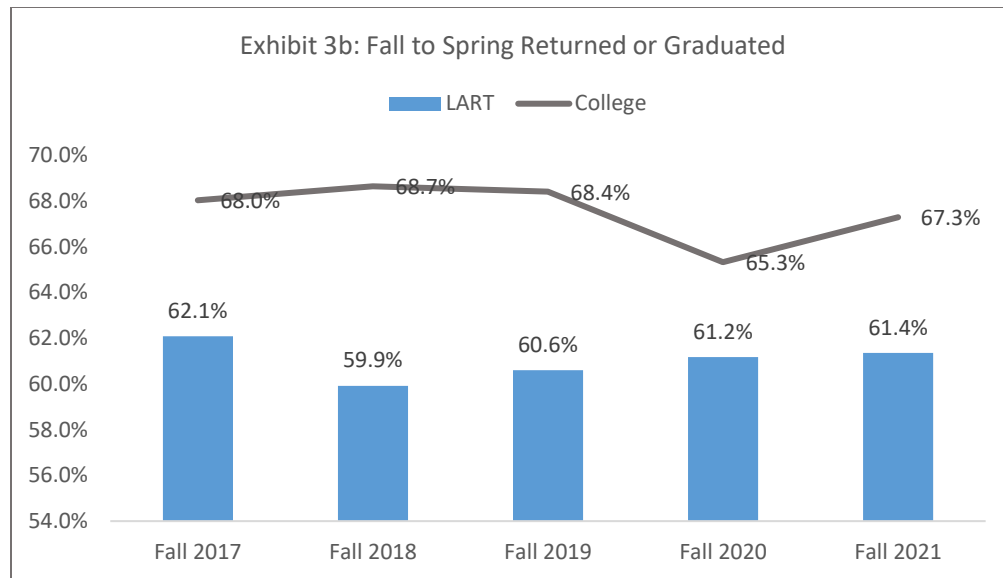
4. Fall to Fall Retention
   a. Percent of LART students who do not persist has decreased by 19.1% between Fall 2017 and Fall 2021; see Exhibit 4a.
   b. The average percent of LART students who do not persist is below the college average; see Exhibit 4a.
   c. The LART program's Fall to Fall Returned to Same Program or Graduated categories have increased steadily by 39.3% from Fall 2017 to Fall 2021; see Exhibit 4b.

Exhibit 4a: Fall to Fall Retention							
LART	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	LART Average	College Average
Headcount	2118	2161	1952	1453	1180	1773	15,056
Returned to Same Program	30.3%	34.3%	33.8%	33.8%	35.0%	33.3%	34.6%
Returned to Different Program	14.6%	13.0%	11.8%	13.6%	10.2%	12.8%	6.9%
Graduated	5.3%	5.3%	5.9%	12.3%	14.6%	7.8%	11.0%
Did Not Persist	49.8%	47.4%	48.5%	40.3%	40.3%	46.1%	47.4%

Exhibit 4b: Fall to Spring Returned or Graduated
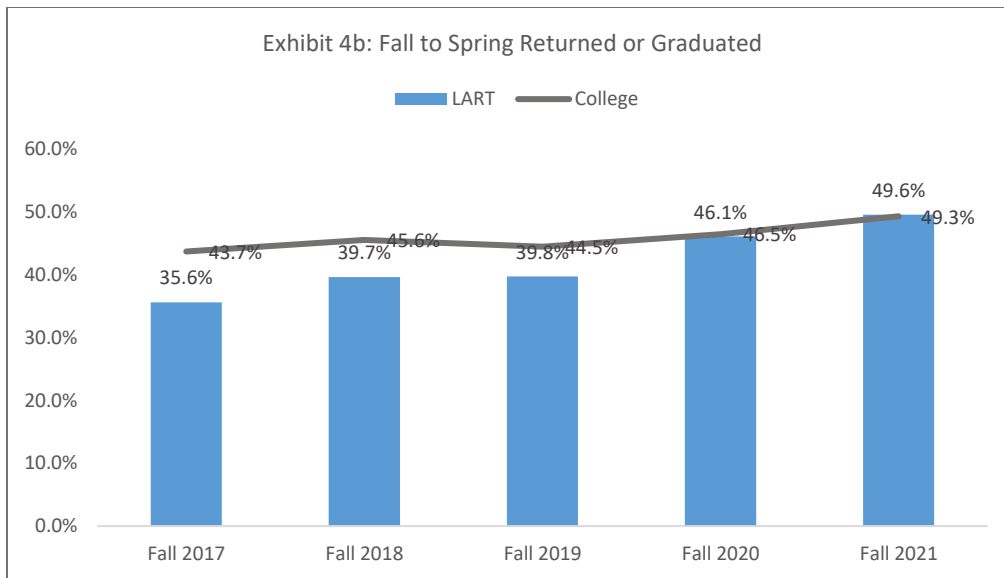
5. Degrees Awarded
   a. The Liberal Arts program awarded a total of 833 degrees between 2017 and 2022.

Liberal Arts Degrees Awarded
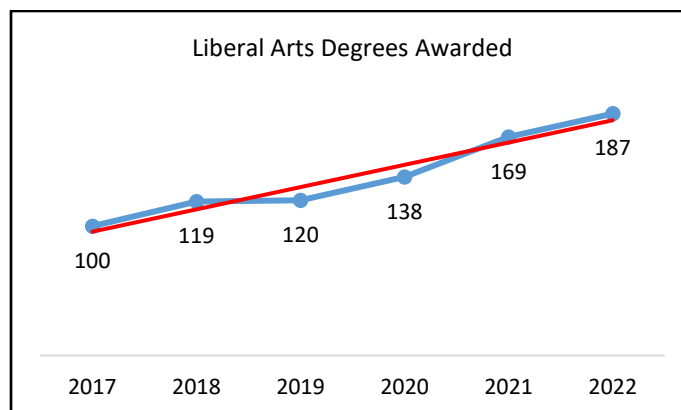
Degrees Awarded							
	2017	2018	2019	2020	2021	2022	Total
LART	100	119	120	138	169	187	833
All A.A. Degrees	1121	1121	1129	1184	1242	1164	6981

6. Transfer:
   Students whose first semester at CCP was between 2016-2020 and last CCP major was Liberal Arts
   a. During the period studied, 27% of students departing from the Liberal Arts Program transferred to another institution.
   b. Of students who transferred, 43% transferred after having earned fewer than 12 credits, and 19% transferred after graduating.

Departing Students who entered the College between 2016 and 2020 *					
Exit Status	Transfer		Did Not Transfer		Total Count of Departing Students
	Count	Percent	Count	Percent	
Graduate	220	47%	253	53%	473
Earned 45 or more credits	74	36%	132	64%	206
Earned 23 to 44 credits	186	29%	457	71%	643
Earned 12 to 22 credits	191	25%	584	75%	775
Earned less than 12 credits	512	22%	1799	78%	2311
Grand Total	1183	27%	3225	73%	4408
* Run Date 11/12/22					

Post-CCP Transfer Institutions

Frequent 4-Year Transfer Institutions
Temple
Pennsylvania State University
Drexel University
West Chester University
La Salle University
Peirce College
Cheyney University of Pennsylvania
Chestnut Hill College
Camden County College
University of Pennsylvania
Indiana University of Pennsylvania

Workforce

7. Employment Opportunities

    The U.S. Bureau of Labor Statistics writes: A college degree lets employers know graduates have learned skills in a specific field. A degree in liberal arts demonstrates the skills graduates have honed, including those employers want in their workers.

    According to studies from the National Association of Colleges and Employers (NACE), employers often rank skills such as critical thinking and communication above technical aptitude as essential for career readiness. "Liberal arts study helps students develop strong foundational competencies," says Paul Timmins, director of career services for the College of Liberal Arts at the University of Minnesota in Minneapolis. "It gives them tools to succeed beyond their first job." [1]

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[1] Putting your Liberal Arts Degree to Work

The following data was accessed through EMSI, a labor market advisor to leaders in higher education, business, and community development since 2001, searching the counties of Bucks, Delaware, Montgomery, and Philadelphia for employment in the following areas:

Code	Description
11-9031	Education and Childcare Administrators, Preschool and Daycare
41-2031	Retail Salespersons
41-1011	First-Line Supervisors of Retail Sales Workers
11-2022	Sales Managers
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products
43-4171	Receptionists and Information Clerks
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive
43-4161	Human Resources Assistants, Except Payroll and Timekeeping
27-3091	Interpreters and Translators
23-2011	Paralegal and Legal Assistants

Regional Compensation Is 8% Higher Than National Compensation

For your occupations, the 2021 median wage in your area is $37,568, while the national median wage is $34,853.
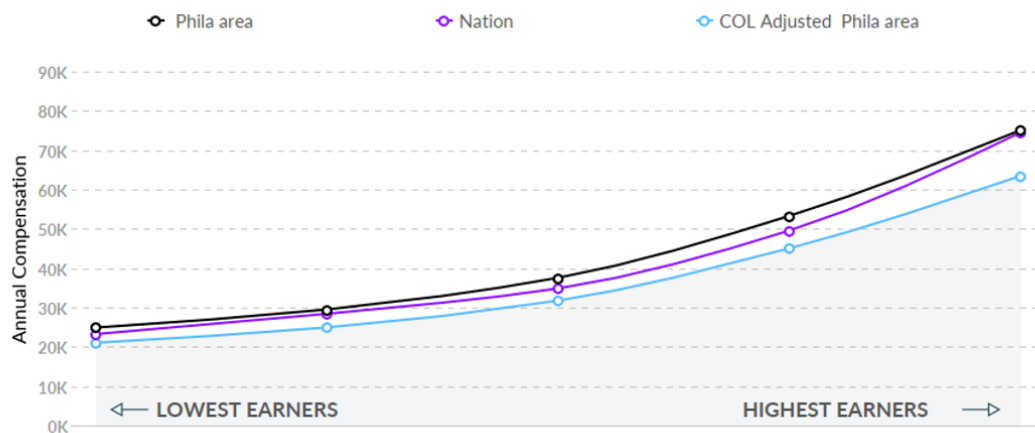
Prior Audit

Recommendations from Fall 2016 Liberal Arts Audit

1. **Retention and Evaluation of FYE Interventions**
   As noted, the drop in enrollment over the past five years has multiple causes, including new programs which cause a migration of students from Liberal Arts into programs which are more closely aligned to students' academic goals.   It is reasonable to assume that as the College implements interventions in the First-Year Experience (FYE) course and completes pathways mapping, there may be an increase in program to program transfers. A plan which tracks and evaluates potential fluctuations in retention and transfer is recommended.   This should show the efficacy of recent changes and inform the program as to further needs. A, "one year out" survey of students who completed the FYE course may provide additional insight.

   Program Response
   An FYE 101 Outcomes Report was conducted for the academic years 2016 – 17 and 2017 – 18. For both years, the report indicated that Liberal Arts students who were enrolled in FYE 101 demonstrated significant increases in retention, movement through developmental and gateway courses (FNMT 118, ENGL 101), and higher rate of degree completion than those who did not take the course.

2. **Faculty Engagement**
   A core group of faculty representing various academic disciplines included in the liberal arts areas should be recruited to serve as a review board. This faculty group should provide advice for issues such as curricular review and assessment practices. Assessment results should be disseminated to this group for analysis and further sharing with faculty in academic disciplines serving the Liberal Arts curriculum. The team could be composed of faculty members from the first year experience course, faculty with experience in transfer, an academic advisor or counselor, and/ or other faculty who teach program courses.

   Program Response
   Before the previous audit, Liberal Arts (LART) was not housed in an academic department. However, since 2016 the program has been housed in the Department of History, Philosophy, and Religious Studies. In addition to the leadership of the department chair and coordinator, a group of faculty from various academic disciplines in Liberal Studies, Academic Advising, and Counseling have taught FYE 101 and/or provided support within the course. Also, FYE 101 has been taught by the Directors of Transfer and Articulation and The Center for Male Engagement. Within the FYE 101 Team, modifications to the first-year course have been done collaboratively.

   This *de facto* review board also extends to academic advisors who have Liberal Arts students in their caseloads, counselors who work with these students on transfer and career exploration, and those on academic probation. Moreover, faculty in Liberal Studies have consulted with the coordinator about the addition of newly developed courses in sociology, gender studies, and global studies to the pathway.

Assessments of FYE 101, both in the FYE 101 Outcomes Report and in AEFIS, have been shared among this cohort of faculty. Starting in 2021, the coordinator has collaborated with faculty who teach program courses to assess the performance of Liberal Arts students in their course in AEFIS.

3. **Assessment Plan**
As the program completes a cycle of curricular revisions begun in 2015-16, an evaluation of learning outcomes and assessment activities is required. This might include realigning or redrafting program learning outcomes, reviewing recently introduced assessments, and/or making further use of technological supports to support collection and timely use of data. It must include a clearly defined calendar of assessment activities explicitly aligned to program learning outcomes, allowing for a complete cycle of assessments which can provide evidence of student learning and ensure quality improvement.

Program Response
In 2017, the coordinator and Director of Institutional Research devised a plan to assess program learning outcomes in FYE 101 – the only course that Liberal Arts "owns." When the College adopted AEFIS in 2019, an assessment of FYE 101 was done using the software. Since 2021, additional courses have been micromapped in AEFIS to assess program learning outcomes twice a year.

Action Items
The Office of Assessment and Evaluation makes the following recommendations based on the key findings:

Enrollment and Demographics
1.   Increase Enrollment as follows:

	Fall 2020 (Bench-mark)	Fall 2023		Fall 2025		Fall 2027	
		Increase in Headcount*		Increase in Headcount		Increase in Headcount	
Headcount	1,453	1,627	12%	1,823	14%	2,114	16%
Returned to Same Program	35%	570	35%	693	38%	846	40%
Graduated	12%	195	12%	237	13%	317	15%

1.   Enrollment growth
A college degree lets employers know applicants have learned skills in a specific field. A degree in liberals arts lets employers know an applicant has developed strong foundational competencies such as critical thinking and communication. Robert Vega, director of liberal arts career services at the University of Texas at Austin, says. "Regardless of the industry, we need people who can solve problems, write well, speak well, bring multiple perspectives to

decision-making; we need people who are good managers, who are cross-culturally competent," he says. "All of that is liberal arts."

According to Emily Griffen, director of the Loeb Center for Career Exploration and Planning at Amherst College, a Liberal Arts Degree is designed to equip students with the adaptability critical to navigating career directions in a rapidly evolving economic environment. It is more worth it than ever.

The City of Philadelphia has partnered with the Community College of Philadelphia (CCP) to establish the Octavius Catto Scholarship. A quick review of the City of Philadelphia Jobs website finds several positions that a Liberal Arts graduate may qualify for, such as:

- o Executive Secretary in the Philadelphia Fire Department
- o Community Outreach Coordinator
- o Clerical Assistant I – Office of Judicial Records $29,000 – 30,000 annual salary

In addition to working with students to develop a career orientation, the Department should partner with other College resources, such as Career Connection, to establish relationships with local agencies and potential employers, identifying the Liberal Arts program as a source of high-quality talent and recruitment opportunities.

Person responsible: Department Head and Department Coordinator with support from Career Connections
Timeline: Fall 2023 through Fall 2028

2. Assessment

Liberal Arts is an interdisciplinary program in which students are required to complete credit hours across multiple disciplines – Humanities, Social Sciences, Natural Science, English, and Mathematics. The faculty who teach many Liberal Arts students reside in their respective academic departments, such as English, Math, History, Psychology, and Biology. Previously these multidisciplinary collaborations presented challenges for student learning assessment. However, as technological advancements at the College have grown and CANVAS course content, including student quizzes and grades, are linked to the AEFIS assessment repository, the Liberal Arts program can now access a rich data source for the interdisciplinary assessment of student learning.

Under the leadership of Dr. Chae Sweet, the DCAF (Division Curriculum Assessment Facilitators) Team has been established. This team includes three Liberal Studies faculty members who work with division faculty to assist in assessment practices, including conducting annual audits of program learning outcomes.

For the 2021-2022 academic year, there has been assessment in AEFIS for Liberal Arts students in courses across several disciplines. Micro-mapping has been done in EASC 111; ENGL 115, 116, 117, and 118; FYE 101: PSYC 101

2022- 2023 additional courses (BLAS 101, PSYC 202, and SOC 233) have been micro-mapped in AEFIS to assess PLO 3: "Analyze content across disciplines to discern and respect diverse experiences and perspectives, such as race, ethnicity, gender, sexual orientation, and ability, from both local and global points of view."

The next steps for the Liberal Arts program are to work closely with the DCAF team to 1) validate the alignment between Liberal Arts PLOs and interdisciplinary course instruction, 2) to collaborate more closely with faculty who teach these courses, and link relevant assignments, 3) analyze Liberal Arts student performance to determine action steps for improvement, and 4) work collaboratively with interdisciplinary faculty to implement changes.

Person responsible: Department Head, Department Coordinator with support from the DCAF team

Timeline: Fall 2023 through Fall 2026

3. Employment Opportunities
   Many well-paying jobs can be filled with certificates or 2-year degrees in today's environment. Large technology companies like IBM are moving away from the 4-year degree and toward skills-based hiring. Add to this the rising costs of higher education and the crushing levels of student loan debt.
   The Liberal Arts program should continue and expand current initiatives to address graduates' requests for career readiness which include the role of Career Connections in FYE:
   - Developing classroom presentations addressing career readiness, such as "I Am Employable," emphasizes the six skills most desired by employers that are developed in the study of liberal arts.
   - Introducing the Handshake feature in Career Connections, which displays job listings with competitive salaries and hourly rates of $14.00 and above.
   - Teaching resume writing: Students can leave the College with a dynamic resume
   - Exploring the logistics of creating internships (paid and unpaid) and experiential learning opportunities for students

   Person responsible: Department Head and Department Coordinator with support from Career Connections and other College resources
   Timeline: Fall 2023 through Fall 2028

4. Capstone Course
   A capstone course is a culminating academic experience that ties together previous courses and provides students the opportunity to focus their intentions toward next steps in career or transfer. As an interdisciplinary course, the capstone experience can broaden students' perspectives, build community, and facilitate transition to a chosen career path or transfer program. The Program should analyze the impact and benefits of adding a capstone to the program curriculum. Considerations might include:
   - What framework could best meet students' needs, program resources, and provide an interdisciplinary, synthesizing experience?
   - In what ways would a capstone experience be beneficial to the students' post-CCP experience?
   - What components of a capstone experience would focus on students' personal growth? Academic growth? Professional growth?

- How would students be guided toward and prepared for a capstone experience? What program structures could be in place (e.g., course requirements, pre-requisites, advising)?

  Based on the impact and benefit analysis, make recommendations for the next steps.

Person responsible: Department Head, Department Coordinator with support from Advising and select faculty

Timeline: Fall 2023 through Fall 2026

Narrative

A liberal arts education seeks to provide students with a range of human experiences, a breadth of perspective, and the skills needed to become leaders in their chosen career fields and meaningful participants in their communities.

In liberal arts, students develop critical thinking from a number of disciplines to analyze complex social and cultural issues and become life-long learners prepared to meet personal, societal, and global challenges. The Liberal Arts degree program provides a pathway for many Community College of Philadelphia students to both transfer and career goals.

Previously these multidisciplinary relationships presented challenges for assessing the Liberal Arts PLOs (program learning outcomes). However, as technological advancements at the College have grown and CANVAS course content, including student quizzes and grades, are linked to the AEFIS assessment repository, the Liberal Arts program can now access a rich data source for the interdisciplinary assessment of student learning.

Under the leadership of Dr. Chae Sweet, the DCAF (Division Curriculum Assessment Facilitators) Team has been established. The team includes three Liberal Studies faculty members, who work with division faculty to assist in assessment practices, including conducting annual audits of program learning outcomes.

For the 2021-2022 academic year, there has been assessment in AEFIS for Liberal Arts students in courses across several disciplines. Micromapping has been done in EASC 111; ENGL 115, 116, 117, and 118; FYE 101, and PSYC 101. There has been continuous improvement in both substantive assessments of program learning outcomes in courses across disciplines and the assessment process.

Student success can be observed in the Fall to Fall retention outcomes for "Returned to Same Program or Percent Graduated" categories that have increased by 38.5% between Fall 2017 and Fall 2021 (see the red trend line in Exhibit 4a) as well as the degrees awarded Chart (See Exhibit 5) showing an increase of 87% between 2017 and 2022.

Much of this progress can be attributed to the development, implementation, assessment, and revision of the FYE, First Year Experience course, required for all new students helping to solidify students' goals while providing direction and support. Also contributing to this progress is the new system of College advisors. Since 2016, the Program Coordinator has collaborated with the advisors to ensure students receive accurate and updated course selection and transfer information. Furthermore, the coordinator and advisors monitor student progress in My Degree Path and Starfish.

Expanding the Program emphasis from transfer ready to career-ready graduates has been insightful for students. The U.S. Bureau of Labor Statistics writes: A college degree lets employers know you've learned skills in a specific field, and a degree in liberal arts demonstrates the skills you've honed, including those that employers want in their workers. According to studies from the National Association of Colleges and Employers (NACE), employers often rank skills such as critical thinking and communication above technical aptitude as essential for career readiness. "Liberal arts study helps students develop strong foundational competencies," says Paul Timmins, director of career services for the College of Liberal Arts at the University of Minnesota in Minneapolis. "It gives them tools to succeed beyond their first job." [2] According to a 2021 AAC&U study, "How College Contributes to Workforce Success: Employer Views on What Matters Most," "Employers believe both breadth and depth of learning contribute to long-term career success."

Employers are also concerned about Diversity, Equity, and Inclusion (DEI) in the workplace. Many of the courses on the Liberal Arts pathway address DEI, and their course learning outcomes demonstrate the awareness, knowledge, and skills required to equitably engage and include people from different local and global cultures as well as engage in antiracist practices that actively challenge the systems, structures, and policies of racism and exclusion.

Starting in the 2022-2023 academic year, the Program Coordinator has forged a relationship with Career Connections. Staff members present the office's services, including resume writing and lucrative job listings for students and graduates. "I Am Employable," a classroom presentation, emphasizes the "soft" skills desired by employers, developed in Liberal Arts, that give graduates an advantage over those in more specialized programs.

The Community College of Philadelphia Graduate Survey summarizes information about the College's graduates. The survey is distributed to students six months after they have completed their course of study and includes items related to current employment, educational activity, and satisfaction with CCP programming. The following comments reflect graduates from the Liberal Arts program who have entered the workplace. Students tell us what is important to them and help direct the next steps for the department.

Student Voice: Liberal Arts Graduates				
Grad Year	Preparation for Employment Rating	Rating	Employer	Comments regarding employment preparation
2016				With the knowledge, I already knew and CCP's help, I feel I am prepared for future employment.
2017	Good	4	Department of Veterans Affairs	internship opportunities
2019				I don't have any suggestions. I'm an adult student and enjoyed my experience at CCP.
2019	Excellent	5	Penn Health System	Perhaps a resume writing course or portfolio. Perhaps if I had taken more computer classes, I would have more confidence in that department
2019	Fair	2		Job fairs with correlating fields of study

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[2] [Putting your Liberal Arts Degree to Work](#)

2019				Training and preparation would have allowed me to find a job with my degree and major.
2020	Excellent	5	Community College of Philadelphia	Possibly a general seminar or series of lectures on employment practices. Most of the general advice I have received about being a polite and conscientious employee has come from the internet or friends and relatives. Other than that, I plan on contacting counselors at CCP for help with college applications.
2020	Good	4	UPS	Better job counseling classes
2021	Poor	1		Easy access to internships and experience in the field people are interested in
2021				Nothing. CCP guided me on a career path that I'm currently on.
2021	Excellent	5	The Home Depot	Technology Courses
	Average Rating	4		Internships, Assistance with employment.

There have been recent developments to address graduates' requests for career readiness:

- While FYE 101 has always had a career exploration component, the role of Career Connections in the course has increased since this office has expanded.

  - Classroom presentations addressing career readiness, such as "I Am Employable," - stresses the six skills most desired by employers that are developed in the study of liberal arts.

  - The Handshake feature in Career Connections displays job listings with competitive salaries and hourly rates of $14.00 and above.

  - Resume writing: Students can leave the College with a dynamic resume

- The Program Coordinator is in discussion with the Director of Career Connections about internships (paid and unpaid) and experiential learning opportunities

- Students and graduates in the Liberal Arts/Communication Pathway receive a monthly email with job listings.

- Staff in alumni relations collaborate with the coordinator for upcoming panel discussions/luncheons where Liberal Arts alumni share their stories.

Academic Program Review:
Business General A.A.

Authors: Arielle Norment, Ruqayyah Archie, Dawn Sinnott, Ph.D., Amy Birge-Caracappa, Lizzie Gordon

Spring 2023

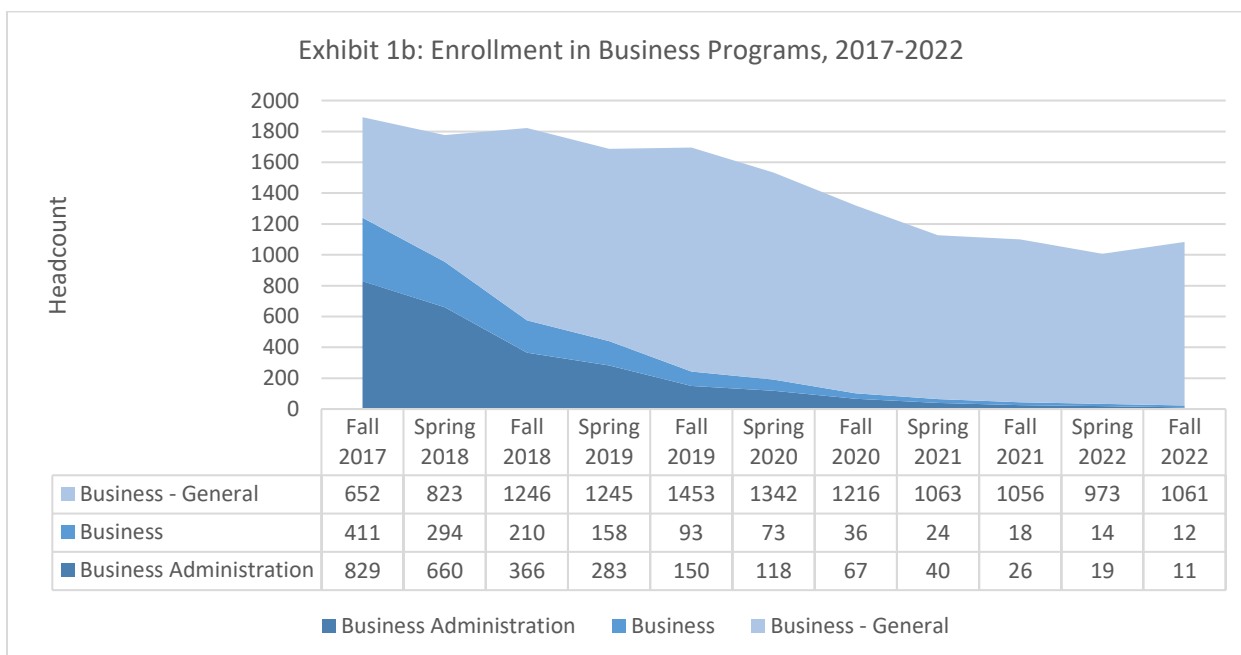Table of Contents

1. **KEY FINDINGS**

Enrollment

A. **Average enrollment:** Average enrollment in the Business General (BUSG) program between fall 2017 and fall 2022 was 1,107 students per semester; see Exhibit 1a.
    *   Business General was created in fall 2017 to consolidate two business programs at the College designed for transfer: Business and Business Administration. This restructuring reflects the College's adoption of the Guided Pathways model. The previous two-program option was a confusing choice for students, and restructuring directs students to a single option with a smaller, more purposeful choice of electives, fewer credits, and a direction that will be informed by their designated transfer institutions; see Exhibit 1b.

Exhibit 1a: College and Business General Enrollment											
	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Average
College-Wide	17,296	16,503	16,671	15,544	15,996	14,789	13,672	12,195	11,647	10,431	11,636	14,216
BUSG	652	823	1,246	1,245	1,453	1,342	1,216	1,063	1,056	973	1,063	1,107

Exhibit 1b: Enrollment in Business Programs, 2017-2022

	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022
Business - General	652	823	1246	1245	1453	1342	1216	1063	1056	973	1061
Business	411	294	210	158	93	73	36	24	18	14	12
Business Administration	829	660	366	283	150	118	67	40	26	19	11

B. **Enrollment and Demographics**
    a. Business General's average full-time enrollment (43.8%) is 14.7 points higher than the College average (29.1%); see Exhibit 2a.
    b. Enrollment by Gender within Race; see Exhibit 2b
        *   On average, the Business General (BUSG) program's distribution of gender and ethnicity is representative of the College population.
        *   The most notable difference is a smaller percentage of Black females enrolled in Business General (19.8%) than the College (30.4%).

c. The proportion of BUSG students between 16 to 21 years of age, 54.4%, is higher than the College's proportion of students in that age range, 43.1%; see Exhibit 2c.
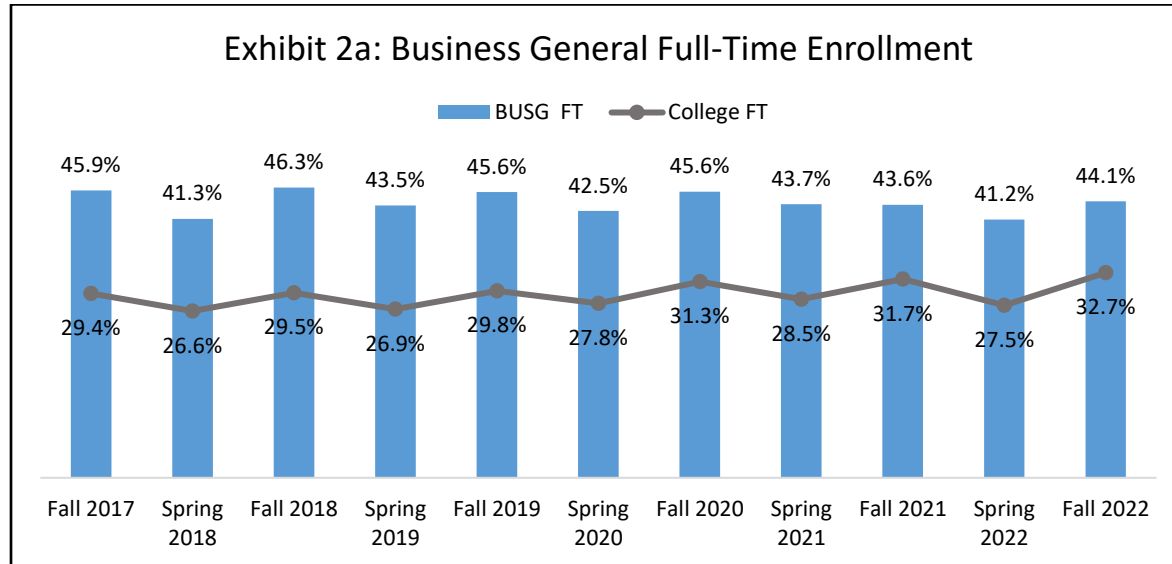

Exhibit 2a: Business General Full-Time Enrollment

Exhibit 2b: Gender and Ethnicity by Business General Majors												
BUSG		Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	BUSG Average	College Average
Asian	Female	6.7%	8.2%	7.5%	7.0%	6.9%	7.2%	6.9%	7.1%	7.3%	8.3%	7.3%	5.6%
Asian	Male	6.4%	7.0%	7.3%	8.0%	8.7%	8.9%	8.4%	7.9%	8.2%	8.2%	8.0%	4.6%
Black	Female	20.9%	20.5%	20.0%	19.8%	18.0%	18.9%	21.7%	21.2%	19.5%	18.4%	19.8%	30.4%
Black	Male	25.1%	22.4%	20.0%	19.5%	19.5%	19.4%	15.5%	14.1%	13.9%	14.4%	18.2%	13.5%
Hispanic	Female	6.7%	6.9%	6.6%	5.7%	7.4%	7.2%	9.4%	9.5%	10.5%	10.8%	8.0%	10.4%
Hispanic	Male	8.0%	6.2%	8.0%	6.7%	7.1%	6.9%	5.0%	5.0%	7.6%	7.4%	6.8%	5.0%
White	Female	7.2%	7.5%	10.6%	11.6%	10.9%	10.2%	11.7%	13.6%	12.7%	12.9%	11.1%	14.4%
White	Male	12.4%	13.0%	11.5%	13.1%	13.5%	13.5%	13.2%	13.2%	12.2%	10.7%	12.7%	8.6%
										Total Female		57.3%	60.8%
										Total Male		42.7%	31.6%

Exhibit 2c: Age of Enrolled Students
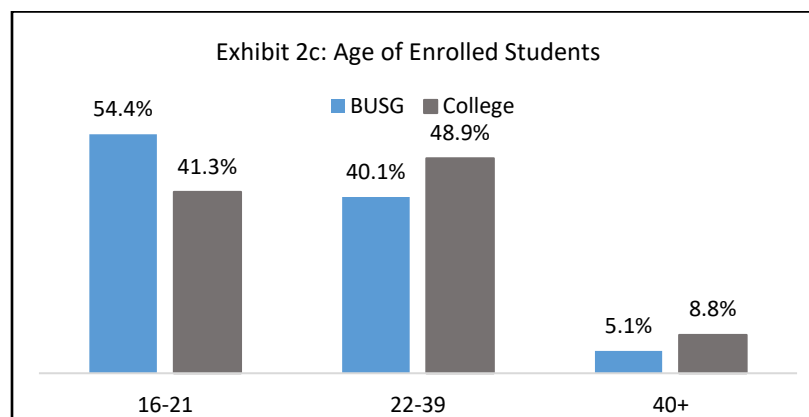
C. Fall to Spring Retention

a. The Business General program's fall to spring retention, Returned to Same Program, averaged 3.4 points higher than the College average, see Exhibit 3a.

b. On average, 73.6% of BUSG students returned to the same program or graduated, while 69.8% of students College-wide returned to the same program or graduated, see Exhibit 3b.

Exhibit 3a: Fall to Spring Retention							
BUSG	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	BUSG Average	College Average
Headcount	652	1246	1453	1216	1056	1125	15,056
Returned to Same Program	71.6%	74.2%	71.2%	65.4%	70.3%	70.6%	67.2%
Returned to Different Program	4.0%	2.5%	3.1%	2.3%	2.7%	2.8%	4.5%
Graduated	0.2%	1.4%	3.1%	4.2%	4.9%	3.0%	2.6%
Did Not Persist	24.2%	21.9%	22.6%	28.1%	22.2%	23.7%	25.8%

Exhibit 3b: Fall to Spring: Returned Same or Graduated

BUSG:
- Fall 2017: 71.8%
- Fall 2018: 75.6%
- Fall 2019: 74.3%
- Fall 2020: 69.6%
- Fall 2021: 75.2%

College:
- Fall 2017: 70.4%
- Fall 2018: 71.0%
- Fall 2019: 70.7%
- Fall 2020: 67.0%
- Fall 2021: 69.2%
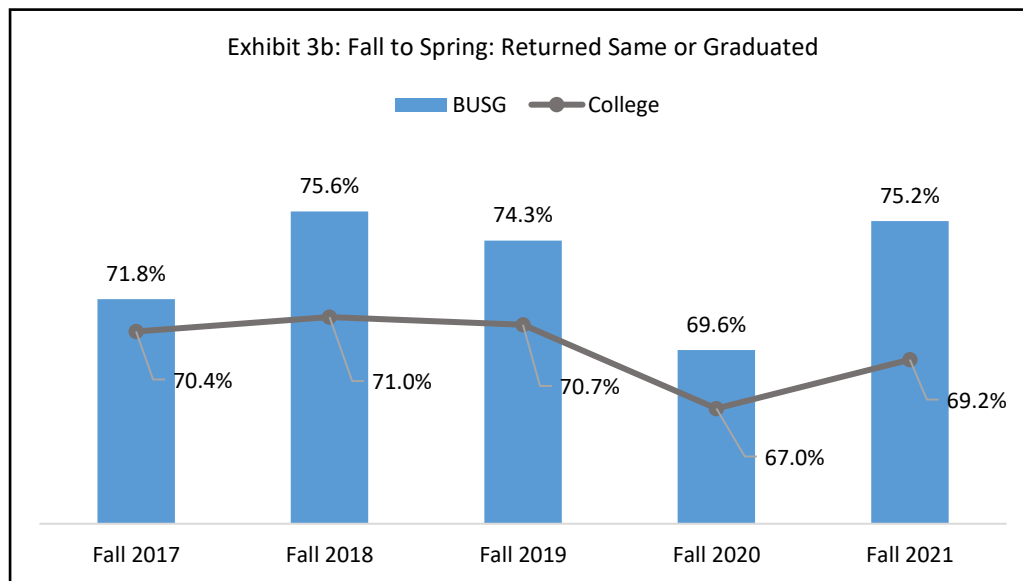
D. Fall to Fall Retention

    a. The Business General program's fall to fall retention, "Returned to the Same Program" (38.8%), was higher than the College average (34.6%); see Exhibit 4a.

Exhibit 4a: Fall to Fall Retention							
	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Average	College-Wide Average
Headcount	652	1,246	1,453	1,216	1,056	1,125	15,056
Returned to Same Program	40.3%	42.6%	35.8%	36.7%	39.7%	38.8%	34.6%
Returned to Different Program	3.7%	4.3%	3.8%	2.8%	4.2%	3.8%	6.9%
Graduated	1.2%	6.7%	13.9%	16.0%	19.5%	12.3%	10.0%
Did Not Persist	54.8%	46.4%	46.5%	44.6%	36.6%	45.2%	47.4%

E. Degrees Awarded

    a. With the closure of Business and Business Administration programs, Business General provided oversight, advising, and the courses that enabled Business and Business Administration students to continue their progress and graduate.

Exhibit 4b: A.A. Degrees Awarded	2017	2018	2019	2020	2021	Total
Business – General (BUSG)		12	76	195	101	384
• Business – (BUSI)	2	3	2	1	0	8
• Business – (BUSN)	64	52	40	28	11	195
TOTAL:	66	67	118	224	112	587
College-Wide A.A.	1,121	1,141	1,129	1,183	525	5,099

F.   Transfer from Business General
   a.   Students whose first semester at CCP was between 2016-2020, and whose last major at CCP was Business General.
   b.   Percent columns represent the proportion of students exiting with a given status who did or did not transfer to another institution, e.g., of the 501 students who exited the Program after graduating during the period studied, 253 (50%) went on to transfer to another institution. (Data accessed 11/26/2022)

Exhibit 4c: Departing Students who entered the College between 2016 and 2020					
Exit Status	Transfer		Did Not Transfer		Total Departing Students
	Count	Percent	Count	Percent	
Graduated	253	50%	248	50%	501
Earned 45 or more credits	76	23%	249	77%	325
Earned 23 to 44 credits	102	21%	381	79%	483
Earned 12 to 22 credits	78	17%	368	83%	446
Earned less than 12 credits	199	16%	1057	84%	1256
Grand Total	708	24%	2303	76%	3011

Frequent Four-Year Transfer Institutions		
Temple University	Public	4-year
Drexel University	Private	4-year
West Chester University	Public	4-year
Pennsylvania State University	Public	4-year
La Salle University	Private	4-year
Peirce college	Private	4-year
St Joseph's University	Private	4-year
Chestnut Hill College	Private	4-year
Widener University	Private	4-year
University of Pittsburgh	Private	4-year
Thomas Jefferson University-East Falls Campus	Private	4-year

G.   Workforce

   a.   Regional employment is about average for related jobs as compared to the National average for an area this size. An average area of this size typically has 89,697 employees, while there are 96,655 here in the Philadelphia area.

The Philadelphia area is about average for these job categories. The national average for an area this size is 89,697 employees, while there are 96,655 in the Philadelphia Area.

Earnings are about average in the Philadelphia area. The national median for these occupations is $87,686, compared to $91,373 in the Philadelphia area.

Job posting activity is high in the Philadelphia area. The national average for an area this size is 3,135 job postings/mo, while there are 3,632 in the Philadelphia area.

Top Companies	Top Job Titles
KPMG	Project Managers
University of Pennsylvania	Accountants
Comcast	Financial Analysts
Robert Half	Staff Accountants
Randstad	Human Resources Generalists
Johnson & Johnson	Operations Managers
Deloitte	Recruiters
GlaxoSmithKline	Human Resources Managers
Merck	Human Resources Coordinators
GPAC	Product Managers

2. **PRIOR AUDIT**

Responses to 2017 Business Programs Audit Recommendations

A. **Evaluate integration between the two departments:** In response to these findings and to an audit recommendation to evaluate the integration of the two departments, the faculty and department heads of the Business Administration and Marketing and Management departments, along with the Dean of the Business & Technology division, evaluated the feasibility of integration and determined that a merging of the departments was feasible and would result in better program outcomes. The two departments were merged into one: Business Administration. Following the merger of programs and departments in 2018, students in the business program have been better supported , as have other students who take business courses. Given that the business program is technically housed in the Business Administration department, having all the core content faculty also housed within that department immediately enabled core faculty of the program to work collectively under a single set of departmental goals and objectives, as well as increased communication opportunities in a single set of departmental meetings.

B. **Evaluate the distinction between the two programs. Assess the need for merging the two programs, further distinguishing the two programs, or closing one of the two programs:** The Business and Business Administration programs were integrated to form the Business General program. Advisors, counselors, and faculty played a significant role in communicating the

change to students and assisting them with understanding the changes in curriculum. Consistent follow-up was made to ensure that students were registering for the correct courses since there were some courses that were discontinued with the integration. Students who moved to Business General from Business or Business Administration were provided with recommended substitutions for any courses that were discontinued in their original program of study.

C. **Complete all Act 335 documents:** As of 2022-2023, all BUSG Chapter 335 course evaluations have been completed and submitted to the Office of the Vice President for Academic and Student Success.

D. **Evaluate the quality and variety of assessment materials, ensure alignment between PLOs and SLOs, ensure faculty collaboration of assessment planning and review across the departments, examine the extent to which the programs incorporate common business education trends and necessary skills into assessment, and let these trends and skills inform the assessment:** Under the direction and leadership of Arielle Norment, Assistant Dean of Business & Technology, the Divisional Curriculum Assessment Facilitators (DCAF) team was formed in the division and a timeline of assessment practices was widely accepted by the department and Business General faculty. Beginning in 2019, the Business General program (department head and faculty) updated their program assessment plan, began to archive course assessment data in one centralized location, built out a program micro-map that clearly aligned the PLOs to individual course learning outcomes (CLOs), and processed and submitted assessment reports from 2017-2019 (now through AY 2021-2022). The Business General program collects assessment data from each core course each semester (fall, winter, spring, and summer), and each PLO is assessed annually.

For the past three years, the department has used AEFIS to gather assessment data and create reports that were used for analysis and faculty discussions. Prior to that, manual documents recorded the number of students who met the benchmarks for each CLO. As of Fall 2022, the Business Administration department/Business General program ceased use of AEFIS and began using a spreadsheet assessment tool to gather assessment data from each course section that was taught during the semester. Program-level data are aggregated from the spreadsheets using an R code. Through the development of this new system, continuous improvement of teaching & learning is encouraged, supported, and tracked.

Course and program-level assessment data is discussed at Business Administration department meetings, allowing faculty to contribute to the discussions surrounding assessment and make recommendations for continuous improvement and action items to improve student learning. Department meetings are held at least once a semester.

E. **Evaluate the articulation agreements:** As of 2022-2023, the Business General program currently has 198 articulation agreements with the following institutions: Alvernia, Arcadia, Bloomsburg, Cal University of PA, Carlow University, Chestnut Hill College, Cheyney, Clarion, East Stroudsburg, Eastern, Edinboro, Harrisburg University of Science & Technology, Holy Family, Immaculata, Indiana University of PA, Kutztown, La Salle, Mansfield, Peirce, Rosemont College, Rutgers, Saint Joseph's, Shippensburg, Southern New University, Temple, West Chester, Western Governors, and Wilmington University.

A full list of these agreements can be found here: https://www.myccp.online/transfer-agreements.

One of the features of the Business General program is that the student's chosen transfer institution determines the mathematics courses to complete in order to be a successful transfer candidate. Students completing MATH 162 and MATH 171 will be best prepared to transfer to baccalaureate programs accredited by the Association to Advance Collegiate Schools of Business (AACSB). Students who graduate with FNMT 118 and MATH 161 can still transfer to an AACSB-accredited program but will need to take higher-level mathematics at their transfer institution to graduate, or they can transfer to several non-AACSB programs and continue in those programs without taking additional math courses. Students are encouraged to consult with an advisor or their intended transfer institution for additional guidance.

F. **Improve outcomes for Business students:** Efforts made across the program, including curriculum changes, merging the Business and Business Administration programs into a single unit with more directed and consistent advising, and assessment leading to improvements in teaching and learning, have improved average retention, annual graduation rates, and overall academic performance since the completion of the last audit in 2016.

Improved Program Outcomes, 2016 compared to 2023			
Outcome	2016 Business Administration Program Average	2016 Business Program Average	2023 Business – General Average
Academic Standing – Good Standing	85.0%	80.47%	88.8%
Fall-Spring Retention – Returned to Same Program	69.6%	62.7%	70.5%
Fall-Spring Retention – Graduated	3.5%	2.9%	3.0%
Fall to Fall Retention – Returned to Same Program	41.2%	34.3%	38.8%
Fall to Fall Retention – Graduated	9.8%	8.8%	12.3%

3. ACTION ITEMS

The Office of Assessment and Evaluation makes the following recommendations:

A. Enrollment and Demographics Action Items

a. **Increase Enrollment** as follows:

	Fall 2020 (Benchmark)	Fall 2023 Increase in Headcount*		Fall 2025 Increase in Headcount		Fall 2027 Increase in Headcount	
Headcount	1,216	1289	6%	1366	6%	1448	6%
Returned to Same Program	37%	535	40%	662	45%	728	45%
Graduated	15%	241	18%	265	18%	291	18%

*Projected enrollment growth is also subject to the availability of College resources, particularly in areas of recruitment, admissions, and support for faculty, material, and supplies, as needs develop.

b. **Increase the percentage of Business General students who complete BUSL 101 (FYE) course in their first twelve credits.** BUSL 101: Navigating Leadership and Business Professions is the first-year experience course developed by the Business and Technology division in 2016. The percentage of Business General students registering for (and successfully completing) BUSL 101 in their first twelve credits has dropped from 14% in Fall 2017 to 6% in Fall 2021. One reason students may not be registering for BUSL 101 upon entry to the College could be related to the course name. Anecdotal and qualitative data has been gathered from the Business Leadership, Fashion & Hospitality department head that suggests that students may be misled by this course title and may associate the course with an introduction to business course. The department is planning to revise the title of the course.

Responsibility: Business Administration Department Head, Student Success Navigator, BLFH Department Head, Office of Curriculum Development

Timeline: Spring 2025

B. Assessment Action Items

a. **Collaborate with the Office of Assessment and Evaluation and the DCAF** to plan and document reassessment and closing the loop efforts toward continuous improvement for the 2023-2024 assessment cycle and beyond.

Responsibility: Department Head with faculty support
Timeline: Fall 2024

C. **Transfer Action Items**

    a. **Continue to evaluate transfer agreements:** As of 2022-2023, the Business General program currently has 198 articulation agreements. The program should review existing agreements as well as develop new ones by specifically examining the relevance of the agreements to student goals, verifying their alignment with the program, updating them to keep pace with curricular change in the Business General program, and developing information materials for students.

        Responsibility: Department Head with faculty support
        Timeline: Fall 2024

D. **Diversity, Equity, and Inclusion Action Items**

    a. **Continue to advance equity and promote DEI initiatives:** When full-time faculty positions are approved for Business General to recruit, the program should seek diverse hires, including women and minorities. In addition, as students are required to complete a three-credit Business elective as a part of the Business General program, Business General should consider adding a new DEI Business course to this list of electives, providing students with an option to study DEI as a part of their required curriculum.

        Responsibility: Department Head with faculty support
        Timeline: 2024-2025

E. **Workforce Action Items**

    a. **Work with Institutional Research to gather alumni testimonials/track career readiness:** In addition to the program's outreach efforts, faculty will often have students reach out to them to provide an update on their progress upon graduation from the Community College of Philadelphia; however, a more efficient approach should be established to track and further showcase/highlight Business General alumni achievements. Alumni should be contacted on an annual basis to track who has entered the workforce either directly upon completion of their A.A. degree or has entered the workforce following the completion of a bachelor's degree at a transfer institution. The division already has a quarterly newsletter featuring at least one alumni student in each issue that is shared widely with students via email, the Pride Portal, and via hard print copies distributed across three academic department suites in the division (Bonnell, CBI, & the Pavilion).

        Responsibility: Department Head with faculty support, Career Support Coach, Institutional Research

        Timeline: Fall 2024

    b. **Strengthen employment opportunities/experiential learning:** Taking advantage of a newly hired divisional Career Support Coach and support from the Workforce, Economic & Innovation division, the Business General program should establish at least one additional experiential learning opportunity for currently enrolled students in the form of a paid internship or apprenticeship.

Responsibility: Business Administration Department Head with faculty support, Career Support Coach, Student Success Navigator, WEI

Timeline: Fall 2025

4. NARRATIVE

The Business General program launched in Fall 2017 as a more cohesive pathway to prepare students to transfer to a four-year business school than was previously available at the College. The program provides students with terminology, knowledge, and foundational skills in the following business areas: Accounting, economics, finance, information technology, marketing, management including business law, and public speaking. Students graduating with an AA in Business General seamlessly enter four-year institutions as juniors with most or all of their academic credits being accepted as transfer credits.

Students often enter the Business General program because they are interested in business and are looking to determine which area of business they want to focus on. The program allows them to explore the introductory courses to various majors offered in four-year institutions, providing them with a framework for each significant area. It provides the fundamental knowledge necessary to be a successful business student with the ultimate goal of graduating from a business transfer institution and finding employment in the business field.

Upon the completion of the Business General degree, students will be able to prepare, analyze, interpret and discuss an entity's basic financial statements verbally and in writing; analyze the legal, economic and social impact of business decisions; quantitatively evaluate the impact of business decisions, activities, and events; and explain the role business has historically taken in different societal and economic systems.

The program stays abreast of the ever-changing business industry through employer partnerships including AON and Accenture (insurance companies and community partners) as well as advisory committees that keep the program up to date with the changes in the industry. Students that are enrolled as Business General majors are invited to join the National Association of Black Accountants (local chapters until a College chapter is initiated) and to participate in study abroad opportunities. These activities allow students to interact with their peers, network with businesses, and develop skills that they will use in the workforce.

The department is currently developing a Business honors program that will allow students to study/practice social justice with the major courses that are included in the Business general program. The Business honors program will allow students to interact with members of the community and explore some of the various artifacts within the city that are related to social justice, including the underground railroad and the African American Museum.