STATE BOARD FOR COMMUNITY AND TECHNICAL COLLEGES

FEBRUARY 2, 2023

STATEMENT OF NEED
BACHELOR OF SCIENCE (BS) IN COMPUTER SCIENCE

CLARK COLLEGE

TABLE OF CONTENTS

Cover Page — Statement of Need

Program Information

Institution Name: Clark College

Degree Name: Bachelor of Science in Computer Science

CIP Code:11.07 “Computer Science”, “11.02 Computer Programing” and 14.0903 “Computer Software Engineering”

Name(s) of existing technical associate degree(s) that will serve as the foundation for this program:

Degree: AST2 Computer Science

CIP Code: 11.0201 “Computer Programming”

Year Began: 1970s

Proposed Start Implementation Date (i.e. Fall 2014): Fall 2024

Projected Enrollment (FTE) in Year One: 20 FTE

Projected Enrollment (FTE) by Year: **Fall 2025:** 40 FTE, **Fall 2026:** 60 FTE, **Fall 2027:** 80 FTE

Funding Source: State-Funded, Tuition and Fees

Mode of Delivery

Single Campus Delivery: Initially, this program will be offered on Clark College’s main campus, with a mix of in-person and hybrid modalities.

Distance Learning: The long-term goal is to have two parallel cohorts, one in-person program and one fully-remote program.

Statement of Need

Please see criteria and standard sheet. ***Page Limit: 20 pages***

Contact Information (Academic Department Representative)

Name: Izad Khormaee

Title: Computer Science & Engineering Department Chair

Address: 1933 Fort Vancouver Way, Vancouver, WA 98663

Telephone: 360-992-2383

Email: ikhormaee@clark.edu

Chief Academic Officer Signature

The Statement of Need must be signed. To sign, double click on the signature line below.

Paul Wickline

Vice President of Instruction

Clark College

X _____

Chief Academic Officer

11/7/2022

Introduction

To establish a pathway for enhanced student success and to address local employment needs, Clark College proposes to offer a Bachelor of Science in Computer Science degree program, in addition to its current Associate of Science – Track 2 - Computer Science Concentration Degree. This will provide a seamless path to students who are interested in a four-year Bachelor of Science in Computer Science degree from Clark College. This option affords several advantages to local students, employers, and the community.

The program structure will be in a 2+2 format. In other words, students will complete their associate degree in the first two years and complete their Bachelor of Science in Computer Science in the second two years. The goal of this program is to provide a Bachelor of Science in Computer Science degree that meets industry needs while supporting low-income students, students of color, place-bound students, working and returning students, as well as first-generation students.

Locally, Bachelor of Science in Computer Science graduates fill only 4% of the annual job openings in this field, and annual job openings are projected to grow at the rate of 19% over the next decade. Employers large and small have confirmed the high demand for these skilled workers, and their current hiring practices show they are looking beyond local graduates to fill the remaining 96% of job listings for Bachelor of Science in Computer Science graduates. Clark College will address this need by leveraging existing resources and student supports to provide local students with a streamlined pathway to degree attainment and industry employment.

A recent survey conducted of the students who are currently pursuing an Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree at Clark College shows a high level of interest in completing their Bachelor of Science in Computer Science at Clark College. These results reveal that 93% of respondents are either interested and/or would consider extending their associate degree to a Bachelor of Science in Computer Science at Clark College. This enthusiastic response to the survey reveals that 398 current Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree students would consider completing their Bachelor of Science in Computer Science at Clark College if it were available today.

In addition, offering a Bachelor of Science in Computer Science degree fully supports Clark College's primary mission of providing quality educational opportunities while reducing educational and employment barriers, especially for historically underrepresented students. Clark College already has the infrastructure in place to support Bachelor of Science in Computer Science students, such as Clark's Collaborate, Assess, Resource and Engage (CARE) program. Clark also serves as a local center for the national association of Mathematics, Engineering, and Science Achievement (MESA). In addition, Clark provides comprehensive financial aid programs, along with experienced faculty, advisors, student success coaches, and tutors. Thanks to these pre-existing resources, Clark College has the capability to deliver a Bachelor of Science in Computer Science at a substantially lower cost to the students and State, as compared to many other institutions. Maximizing established resources to the fullest is a win-win proposition for local students, employers, community, and Washington State taxpayers.

In summary, expanding Clark College's associate degree program to a four-year Bachelor of Science in Computer Science program represents a unique opportunity to take advantage of existing supports to meet the high demand for Bachelor of Science in Computer Science graduates. Clark

College students' documented enthusiasm for expanding to a Bachelor of Science program, combined with knowledgeable faculty, staff, and services already in place, underscore the College's ability to successfully provide a high-quality, cost-effective education. This program will benefit both local employers and students – particularly place-bound, working, and historically underrepresented students – while utilizing statewide academic resources to the fullest.

Criteria 1

Relationship to institutional role, mission, and program priorities.

The creation of a Bachelor of Science in Computer Science degree at Clark College aligns with the College's institutional priorities in service to the community. Clark is Southwest Washington's largest public institution of higher education, serving Clark, Skamania, and western Klickitat counties – an area referred to as the Local Service Area (LSA). Although Clark College serves three Southwest Washington LSA counties, the college is geographically located within the Portland-Vancouver metropolitan area, which includes Clark, Skamania, Klickitat, Multnomah, Clackamas, and Washington counties, and will be referred to as the Metropolitan Statistical Area (MSA).

This economic region features a wide range of businesses and industries with a concentration in eight key sectors: Apparel & Outdoor, Bioscience, Climate Tech, Computers & Electronics, Design & Media, Food & Beverage, Metals & Machinery, and Software. Designated the "Silicon Forest", the Computer & Electronics sector is the region's economic powerhouse and offers significant opportunities for expanded growth. This region is home to numerous large employers of Bachelor of Science in Computer Science graduates including Intel, Tektronix, SEH America, Hewlett Packard, Nike, ZoomInfo, Logitech, Analog Devices, WaferTech, Lam Research, US Bank, Polaris and Apple, in addition to a growing number of smaller startup companies.

Clark College is an open-enrollment community college, and as such, welcomes students of all ages and backgrounds in pursuit of a quality education to prepare for rewarding careers. Students have the option to earn high school diplomas, GEDs, certificates, degrees in career and technical programs, transfer degrees, and Bachelor of Applied Science degrees. The curricula are aligned with high schools, baccalaureate institutions, and industry to increase transferability of courses and further improve student success.

More specifically, Clark College's mission is "to guide individuals in achieving their educational and professional goals," as measured by attainment of student learning outcomes and post-college success. A key component of Clark's mission fulfillment is the reduction or elimination of barriers to success and disparities in educational outcomes. To achieve this goal, Clark College has demonstrated success in serving non-traditional and historically underrepresented student populations through community outreach programs, as well as support for its current students through one-on-one advising, success coaching, and additional support programs.

Currently, 429 part-time and full-time students are pursuing an Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree at Clark. Upon completing this program of study, students have the option to either enter the workforce or transfer to another institution to complete a four-year Bachelor of Science in Computer Science degree. Establishing a Bachelor of Science in Computer Science degree program at Clark College would provide a seamless pathway for students to pursue additional educational and employment opportunities without having to transition to an outside institution.

There are several benefits to not changing schools halfway through a degree program:

- Students who have completed their two-year degree at Clark College are already familiar with institutional processes (registration, financial aid, etc.) and are able to access Clark's network of student supports.
- Clark College's Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree currently offers after-hours, remote, and hybrid courses to support place-bound and working students. Bachelor of Science in Computer Science degree students would be able to take advantage of this same flexible scheduling.
- Career counseling and academic advising support can continue uninterrupted for students as they pursue their Bachelor of Science in Computer Science degree.
- Students will continue to benefit from existing working relationships developed with faculty, staff, and fellow students.

Expanding these offerings will be especially helpful for students who are historically underrepresented and for whom transitions to outside institutions may present major economic and geographic hurdles toward completing a four-year degree.

In summary, by offering a Bachelor of Science in Computer Science, Clark College can increase student success rates by providing consistent support for students and mitigating systemic impediments to completing their four-year degree. This degree program at Clark College will benefit all students interested in Computer Science, but especially those who are historically underrepresented. This effort fully aligns with existing program priorities of Clark's Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree, the College's mission statement, and its role in supporting students throughout the service district.

Criteria 2

Support of the statewide strategic plans.

As stated in the Mission Study by the State Board for Community and Technical Colleges (SBCTC), its overarching goal is "to find more and better ways to reduce barriers and expand opportunities for more Washingtonians" who are seeking to complete the qualifications necessary to successfully compete in today's job market. Computers already have become a part of nearly every human endeavor, and as the needs they address become more complex and widespread, the demand for workers with a Bachelor of Science in Computer Science will continue to grow. Thus, it is imperative to provide the additional capacity to assist students interested in completing their Bachelor of Science in Computer Science to address these needs.

Clark College already has an established track record of students successfully completing an Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree. A Bachelor of Science in Computer Science at Clark College would further develop this existing capacity, enabling students who are seeking a four-year degree to have the choice to remain at Clark College instead of having to re-apply to other institutions, a process that often involves complications of credit transfer, increased tuition costs, and relocation. Instead, Clark's program will eliminate those barriers by affording a seamless pathway to a diverse student group. Another significant advantage for these students is that they are already established in our community and can more easily find job opportunities locally if they choose to remain in the community.

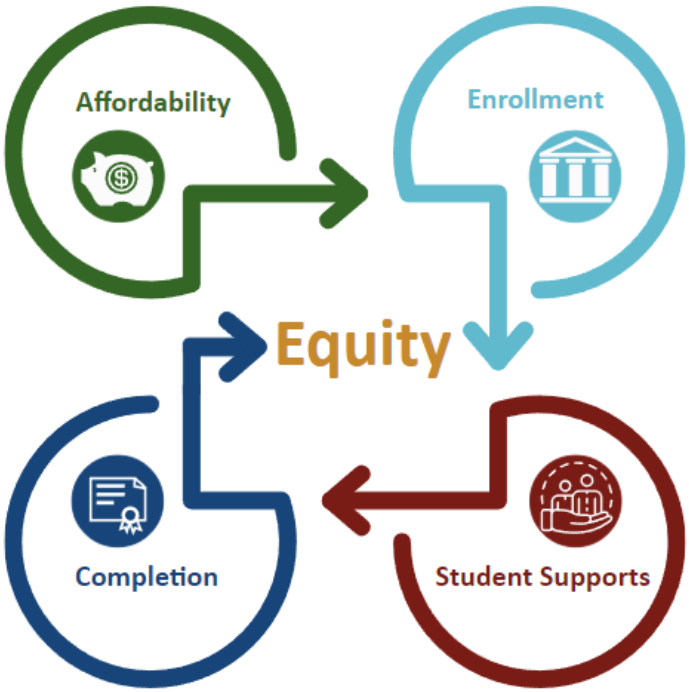

Figure 1. Washington Student Achievement Council's Strategic Framework

Furthermore, Clark's program will meet one of the four pillars of the Washington Student Achievement Council's Strategic Framework for Equity: Affordability. The cost of a Bachelor of Science in Computer Science degree at other nearby institutions is 1.5 to 7 times higher than the projected costs at Clark College for a Bachelor of Science in Computer Science (see Criteria 6).

Clark College's current Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree program already operates in alignment with a second pillar of the Washington Student Achievement Council's Strategic Framework for Equity: Student Supports. For example, Clark College provides an educational plan for every student in the Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree and provides dedicated faculty advisors who meet regularly with students to review their progress and address any obstacles to degree attainment. These relationships will extend to students in the Bachelor of Science in Computer Science program. Faculty advisors will be able to build on their rapport with students with whom they have already been working. Access to faculty advisors can be especially important for historically underrepresented students who may not have a network of friends and family with the knowledge and experience to help them navigate higher education processes. Therefore, full utilization of these resources will provide more equitable outcomes for Bachelor of Science in Computer Science students in pursuit of educational attainment and employment, ultimately in support of a third pillar of the Washington Student Achievement Council's Strategic Framework for Equity: Completion.

Criteria 3

Employer/community demand for graduates with baccalaureate level of education proposed in the program.

The source of employer data presented in this section is derived from Lightcast Q3 2022 Data Set from Economic Modeling Specialist International (EMSI). EMSI provides employment data by CIP code and region. A Bachelor of Science in Computer Science prepares students for careers in the job areas of Computer Science (CIP Code 11.07), Computer Programming (CIP Code 11.02), and Computer Software Engineering (CIP 14.0903). The region is selected based on the three counties in the Clark College Local Service Area: Clark, Skamania, and Klickitat.

Using the above criteria, EMSI data indicates that the average pay for the specified careers is $139,172. In 2022, there were a total of 15,285 jobs with a projected growth of 19% over the next decade. The annual number of job openings in this area is 1,507. Washington State University-Vancouver campus is the only institution in the Clark College Local Service Area with a Bachelor of Science in Computer Science and has graduated 53 students per year in the past three years. Based on this data, the Clark College Local Service Area has a gap of 1,454 unmet Bachelor of Science in Computer Science jobs per year. In other words, Bachelor of Science in Computer Science graduates in the Local Service Area only satisfy 4% of job openings per year.

When expanding the service region to include our six neighboring counties in Portland and Vancouver, the number of annual job openings increases to 13,560. The three higher education institutions in this expanded region include Portland State University, University of Portland, and Washington State University-Vancouver with an annual average of 273 Bachelor of Science in Computer Science graduates. The gap subsequently increases to 13,287 regionally unmet Bachelor of Science in Computer Science jobs per year.

In summary, there is a large gap between the number of Bachelor of Science in Computer Science graduates and the number of openings with employers in our Local Service Area and the expanded metropolitan areas. Expanding to include a Bachelor of Science in Computer Science program at Clark College will help improve this situation, but the need will continue to far exceed available graduates for the foreseeable future.

(Please refer to Appendix A for the Supply/Demand Gap Rubric.)

Criteria 4

Baccalaureate program builds from existing professional and technical degree program offered by the institution.

Clark College already offers an Associate in Science-Track 2 - Computer Science concentration degree, a program that has been in existence since the 1970s in one form or another. Currently, 429 full- and part-time students are enrolled in this program, each with an individualized education plan. A Bachelor of Science in Computer Science would be a highly desirable next step for these students. A student survey of these students in October of 2022 revealed that 398 students, or 93% of those taking the survey would consider completing their Bachelor of Science in Computer Science at Clark College if it was offered.

The following table contains the number of Clark College students who are currently pursuing computer science associate degree and have individualized education plan as well as historical data:

Academic Years	Number of Students
2022-2023	429
2021-2022	398
2020-2021	332
2019-2020	302
2018-2019	279
2017-2018	297

Table 1. Historical number of Clark College Computer Science Associate Students with individualized education plan.

Additionally, Clark College offers other associate degrees such as Computer Technology and Networking Technology. With additional coursework, students in these associate degree programs would also be potential candidates for the Bachelor of Science in Computer Science degree.

Clark College's plan is to develop the Bachelor of Science in Computer Science program at Clark College as a 2+2 program. Initially, the focus will be on students who have completed the associate with a Computer Science concentration in their first two years. These students would be able to finish their Bachelor of Science in Computer Science with an additional two years of full-time study. Future goals include offering transition courses for students who have completed other associate degrees to provide multiple pathways for attaining a Bachelor of Science in Computer Science at Clark.

Criteria 5

Student demand for program within the region.

Clark College has approximately 429 full- and part-time students pursuing an Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree. These are the most likely students to be interested in completing their Bachelor of Science in Computer Science at Clark. While the population of potential students for a Bachelor of Science in Computer Science is likely larger, the survey focused on the core group of students already in the Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree program. The survey was conducted in October 2022 and was completed by 141 respondents. Key takeaways from the survey include:

- 46% of respondents had graduated from high school in the last two years, which indicates that students are traditional high school completers moving on to college. The remaining 54% had not graduated yet or are returning/non-traditional students.
- 86% of students plan to continue beyond an associate degree and pursue a Bachelor of Science in Computer Science degree. The remaining 14% plan to seek employment after completing an associate degree.
- 48% of students responded with "Yes, I am interested in completing my Bachelor of Science in Computer Science at Clark College". Another 45% of students responded that they would consider a Bachelor of Science in Computer Science at Clark College. Only 7% responded with "No, I will not be completing my Bachelor of Science in Computer Science at Clark College".

Applying these percentages to all the students currently in Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree: if Clark College was currently offering a Bachelor of Science in Computer Science, 205 of the students would apply to the program and another 193 students would consider applying. These numbers far exceed Clark College's ability to meet these needs in the first three years of the program. The level of demand outstrips even the proposed additional enrollment capacity at Clark College.

The following enrollment projections do not include students in their first and second year (associates) program, which we expect to continue growing from the current enrollment of 429 students:

- 2024-2025 (20 students): Juniors only
- 2025-2026 (40 students): Juniors and Seniors
- 2026-2027 (60 students): Increase offerings and modalities for Junior-level courses
- 2027-2028 (80 students): Increase offerings and modalities for Senior-level courses
- 2028-2029 (88 students): Expected 10% growth

Criteria 6

Efforts to maximize state resources to serve place-bound students.

Clark College degrees and programs are designed to accommodate students with life and work demands beyond classes. Currently, Computer Science courses are offered in both hybrid (in-person with online support) and fully remote (synchronous over Zoom) modalities. Courses for a Bachelor of Science in Computer Science will initially be offered in hybrid format, and as the number of students grows, the program will expand course offerings both in terms of time (day and evening) and in modality (hybrid and remote) to provide maximum flexibility for both place-bound and working adults.

Within Clark College's tri-county Local Service Area, Washington State University – Vancouver (WSUV) campus is the only institution offering a Bachelor of Science in Computer Science Degree. WSUV has graduated 53 Bachelor of Science in Computer Science graduates annually over the past three years. This leaves the Local Service Area with a deficit of 1,454 or 96% of annual job openings for Bachelor of Science in Computer Science that will go unfilled at the current graduation rate.

In an expanded service area that covers neighboring Oregon state counties (Portland Metro), there are two additional universities offering a Bachelor of Science in Computer Science: Portland State University (PSU) and the University of Portland (UP). These two institutions have a combined average of 220 Bachelor of Science in Computer Science graduates per year. However, Washington students pay out-of-state tuition rates at PSU, and UP is a private university, which increases tuition costs for students transferring to these institutions.

Below is a summary of costs for completing the third and fourth year of Bachelor of Science in Computer Science at nearby institutions (based on the 2022-2023 rates published by these respective institutions).

Institution	Total Third- and Fourth-Year Cost (15 credit each term)	Cost Ratio
Clark College Proposed Degree	$2,438*6 quarters = $14,628	1.00
Washington State University Vancouver-Campus	$5,634*4 semesters = $22,536	1.54
Portland State University out of state	$9,300*6 quarters = $55,800	3.81
University of Portland Private	$25,676*4 semesters = $102,704	7.02

Table 2. Cost of Upper Level (final two years) Bachelor of Science in Computer Science programs.

Clark College faculty and staff have met and discussed the prospect of a Bachelor of Science in Computer Science with four-year institutions (Washington State University), community colleges (North Seattle, AppConnect Northwest Consortium, Lower Columbia College, Bellevue College), Washington Computer Science Education (WACSE) Council, and local employers such as Hewlett-Packard, Intel, and Skyetel. The need for more Bachelor of Science in Computer Science graduates is clear and agreed upon by all stakeholders.

The Bachelor of Science in Computer Science will be built on top of the existing Associate in Science – Track 2 (AST2) – Computer Science Concentration Degree, which provides the core computer science learning for the first two years of a Bachelor of Science degree. The third and fourth years will focus on introducing students to specializations within the Computer Science field, while working closely with local employers to evaluate and modify specializations to meet the ever-changing needs of the industry.

By leveraging Clark College's experience in both supporting students with diverse backgrounds and working closely with local industry, Clark College is able to develop a Bachelor of Science in Computer Science tailored to the unique needs of students in the Local Service Area and to the changing needs of local employers.

Criteria 7

Promoting equitable opportunities for students, including historically marginalized students.

Clark College is one of the largest community colleges in the State of Washington, with 7,935 students enrolled in the 2021-2022 academic year. The following table contains the student demographics for the academic year 2021-2022.

Race	Number of Students	% of Total
American Indians and Alaska Natives	40	0.5%
Asian	459	5.8%
Black	162	2.0%
Hispanic	577	7.3%
Pacific Islander	63	0.8%
White	4953	62.4%
2+ Races	1069	13.5%
Not Reported	612	7.7%

Table 3. 2021-22 Student Demographics at Clark College.
(*Source:* *https://www.sbctc.edu/colleges-staff/research/data-public/enrollment-data-dashboard.*)

The two greatest barriers for historically underrepresented students are:

- accessing available resources; and
- navigating higher education systems.

Although there are many reasons for these barriers, as noted above historically underrepresented students typically do not have access to a network of friends and family who might have experience with the higher education requirements and processes, they may encounter.

In order to improve students' awareness of available resources and opportunities, Clark College plans to expand outreach and target programs, emphasizing outreach to middle and high schools. Clark College Computer Science faculty have an established history of providing workshops, camps, and other hands-on activities to the local schools and the community as a way of introducing students to computer science education and career opportunities.

Clark College is also one of the Mathematics, Engineering, Science Achievement (MESA) centers in Washington State. MESA is a program designed to increase the number of historically underrepresented (African American, Native American, Latino/Hispanic, and Pacific Islander/Hawaiian) community college students who transfer to universities and earn STEM (science, technology, engineering, mathematics) Bachelor's degrees. Clark College plans to leverage its previous success in engaging and supporting historically underrepresented students for the benefit of Bachelor of Science in Computer Science students.

In addition to MESA, Clark College will work with community organizations who support historically underrepresented groups, such as the National Association for the Advancement of Colored People (NAACP)-Vancouver Branch and ASPIRA (a national Hispanic organization dedicated exclusively to developing the educational and leadership capacity of Hispanic youth), the American Indian Science

& Engineering Society, and the Society of Women Engineers (SWE).

Once students are aware of available resources and opportunities, the next step is to offer them support in their efforts to navigate the higher education system. One of the most effective ways to do this is having faculty advisors meet each student one-on-one early in the student's planning process to develop an educational plan. Students continue to meet regularly with their faculty advisor throughout their time at Clark College, receiving advice, guidance, and support tailored to their specific goals. This arrangement has proven to be effective in improving success rates for all students and is especially crucial for students who lack access to these support systems. We plan to extend our current advising programs to encompass the needs for students wishing to complete their four-year Bachelor of Science in Computer Science at Clark College.

In addition, embedded within Clark College's Strategic Plan is the objective to "facilitate student learning by providing conditions that improve educational outcomes and eliminate systemic disparities among all groups." This objective guides the principles underlying Clark College's decision-making, policies, and processes (see Figure 2).

Figure 2. Clark College's Strategic Plan

In pursuit of this objective, Clark College's CARE Team provides one-on-one support for students who have been identified by faculty as likely to benefit from support and/or resources to overcome challenges to their academic progress. Additionally, Clark College's Office of Diversity, Equity, and Inclusion (ODEI) office supports the Clark College's goal of fostering a social and equitable college community as outlined in Clark College's Strategic Plan, and works to ensure that the college's Social Equity Plan is implemented across the college.

Appendix A. Supply/Demand Gap Rubric

College Name: Clark College	
Program Name: Bachelor of Science in Computer Science	
Select one: Existing Occupation ☒ or Emerging Occupation ☐	
Local demand/supply information is available for the specified degree program and target occupation(s)	
Local Demand Data	Bachelor of Science in Computer Science prepares students for jobs in Computer Science (CIP Code 11.07), Computer Programming (CIP Code 11.02) and Computer Software Engineering (CIP 14.0903). The employment data for Clark College's Service Area is from Lightcast Q3 2022 Data Set by Economic Modeling Specialist International (EMSI). EMSI data shows that the average pay for the specified careers in the local service area is $139,172. In 2022, there were a total of 15,285 jobs with a projected growth of 2,904 (19%) over the next decade. The annual number of job openings in this area is 1,507.
Local Supply Gap	Washington State University-Vancouver campus is the only institution in the Clark College Local Service Area with a Bachelor of Science in Computer Science and has graduated 53 students per year in the past three years, representing 4% of annual job openings.