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INTRODUCTION

WHY BIOSCIENCE?

For decades, bioscience has been identified as an industry of opportunity for the San Antonio region. Often referred to as the “Home of Military Medicine,” and the new destination for Precision Therapeutics, San Antonio is at an intersection of military, commercial, and academic assets that position the region to grow its bioscience ecosystem into a world-class hub for business, talent, and discovery.

The San Antonio Economic Development Foundation (SAEDF) leads the region’s efforts in strategic economic and workforce development. Part of this work is to determine how best to strengthen the area’s industries of focus. Through its workforce development team, SA Works, SAEDF engaged leading academic, government, and private-industry stakeholders within the bioscience research and commercialization sectors to learn more about the short-term needs for high-demand, hard-to-fill jobs in the region.

KEY OUTCOMES

To effectively grow San Antonio’s bioscience industry to its full potential, the results of this effort underscore the need to: 1) Define bioscience, 2) Invest in growing existing biosciences stakeholders, and 3) Prioritize recruitment of large bioscience organizations.

In June of 2019, SAEDF initiated a collaborative regional effort to recalibrate the five-year economic development strategy. The six-month, private-sector led process re-examined the region’s target industries and go-to-market strategy to best position the region for success and to overcome significant challenges. The strategy focuses on growing jobs, developing local talent, and improving quality of place in the San Antonio-New Braunfels Metropolitan Statistical Area (MSA).

During the Target Sector Assessment phase of the strategic planning process, consultants interviewed and surveyed over 4,000 individuals from across the region, representing industry, academia, nonprofits, and government. Bioscience was again identified as an opportunity industry for the region. From the report:

“Greater San Antonio also has a clear competitive advantage in Military Medicine. The region is home to several leading military medical research missions and academic research institutes. At Joint-Base San Antonio (JBSA), the US Army Institute of Surgical Research (USAISR), the 59th Medical Wing (59MDW), and the Naval Medical Research Unit San Antonio (NAMRU-SA) house research institutions with specific and unique national advantages in the trauma, critical care, and clinical training space.”
In addition to its military assets, the San Antonio region has a collaborative and innovative research advantage. In late 2019, the presidents of the four largest research facilities in the region announced a strategic partnership in a precision therapeutics initiative. The San Antonio Partnership for Precision Therapeutics (SA PPT) consists of University of Texas Health San Antonio (UTHSA), Texas Biomedical Research Institute (Texas Biomed), the University of Texas at San Antonio (UTSA), and Southwest Research Institute (SwRI®).

Precision medicine generally focuses on personalized interventions based on genetics, environment, and diet. Precision therapeutics merges this discipline with a complete drug discovery pathway, integrating the two in a way that’s never been done before. Ethnic diversity also makes the region a prime location for the development of a precision therapeutics model. With a Hispanic population that is expected to double by the year 2050, San Antonio currently reflects the future demographic makeup of the nation. Of the MSA’s more than 2.5 million residents, 65% are Hispanic, and of this group, 91% are of Mexican descent. The existing bioscience assets and demographics make the San Antonio region the only place to successfully grow this groundbreaking partnership.

As mentioned above, bioscience as a regional opportunity is not new. In 2018, the San Antonio Chamber of Commerce released a Healthcare and Bioscience Economic Impact Study, based on 2017 data. The report estimated an economic impact of more than $40 billion from healthcare and bioscience collectively. These industries employed over 18% of San Antonio’s 2017 population, with more than 1 in 6 people working in health care or bioscience. The report provided comprehensive estimates of the industry, of which 8.1% was research and 9.5% were pharmaceuticals. Because the report data included individuals working both in research and development (R&D), and clinical environments, more targeted investigations are needed to better define the economic impact of the bioscience sector alone.

The industry should promote the growth of nonprofit R&D institutes, such as BioBridge Global, SwRI, Texas Biomed, UTSA, and UTHSA, as well as the three military research laboratories. These nonprofit R&D organizations serve as the bioscience industry’s key stakeholders and “nutrient trees”, as the largest contributors to the workforce and economic growth of the sector, representing the majority of the bioscience workforce. It is through robust, large organizations that a sector can cultivate the necessary talent and innovations to attract and create new companies and spark economic growth.

San Antonio is currently home to a budding bioscience startup landscape. But the results of this study found that startup companies represent a small portion of the current bioscience workforce, further highlighting the importance of investment in existing large stakeholders and recruiting additional large organizations.

**WE MUST:**

1. **DEFINE THE SECTOR**
2. **INVEST IN EXISTING STAKEHOLDERS**
3. **RECRUIT LARGE ORGANIZATIONS**

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bioscience organizations. The startup ecosystem has room to grow if it is to rival the size of other Texas metro areas like Houston, Dallas, and Austin, and the entire bioscience ecosystem must expand for that growth to occur.

Another report showcasing San Antonio’s unique bioscience assets is the “Military Life Science Commercialization Action Plan,” published by the City of San Antonio. From the report:

“…despite the immense significance of the military medical research ongoing in San Antonio, the community, at large, still exhibits an inhibitory gap in the understanding of the military medical research system.”

To close the identified gap, the report called for the creation of a San Antonio Military Medical Innovation (SAMMI) position to ensure alignment of bioscience economic development efforts with the Military Medical Mission. In late 2019, the SAMMI Director position was filled and should help maximize the military medical assets in the ecosystem.

BiomedSA also released an industry strategy report that underscored the uniqueness of San Antonio as a location for bioscience research. As previously mentioned, the demographics of San Antonio represent that of the nation’s future, allowing for a unique opportunity to research high-impact healthcare threats such as Diabetes, Alzheimer’s disease, and cancer.

The 2019 San Antonio Bioscience Workforce Needs Survey, focus group, and publicly available resources, has resulted in the data within this report. This data and outreach informed recommendations designed to promote economic development and increase workforce program alignment. In addition, specific initiatives have been identified as a means to execute the recommended actions.

**GOAL**

**To clearly identify the short-term needs for high-demand, hard-to-fill jobs within San Antonio’s bioscience industry.**

The 2019 San Antonio Bioscience Workforce Needs Survey targeted 42 bioscience organizations within San Antonio, of which, 21 responded. The 50% response rate is above average for a survey of this type. The respondents were: 11 small companies/startups (15 > employees), 5 medium/large organizations (15 < employees), 3 staffing agencies (primarily staffing Department of Defense positions), 1 military research laboratory, and 1 advocacy group. The data in this report

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2 https://www.sanantonio.gov/IID/Industry-Clusters/Biosciences-And-Healthcare
includes the culmination of over 70 positions reported by these organizations as well as data gathered by Economic Modeling Specialists International (Emsi). Emsi provides labor market data to professionals in higher education, economic development, workforce development, talent acquisition, and site selection and covers more than 99% of the workforce, compiling data from a variety of government sources, job postings, and online profiles and résumés.

**KEY OUTCOME #1**

There is a need to collectively define “bioscience” as an industry in San Antonio.

"...LACK OF DIFFERENTIATION BETWEEN HEALTH CARE SERVICES AND BIOSCIENCE INNOVATION. WE NEED WORKFORCE SOLUTIONS FOR HEALTH CARE SERVICE PROVIDERS BUT THIS IS A DIFFERENT SKILLSET THAN NEEDED FOR BIOSCIENCE INNOVATION."

-- INDUSTRY RESPONDENT

The 2019 San Antonio Bioscience Workforce Needs Survey also asked the respondents to define Bioscience. The variability in these definitions resulted in the first key outcome of the survey, the need for more clarity on what the ecosystem defines as “Bioscience.” The need led to an industry focus group, the results of which are outlined on the following page.

The survey responses regarding the industry definition resulted in the following themes:

1. “Living Organisms”
2. “Distinct from Healthcare”
3. “Involves R&D and Commercialization”
4. “Goal to improve the quality of life”

With these themes as a guide, the focus group collectively redefined the industry. Please note this definition is used in the remainder of the report, with each reference to “bioscience” taken to mean the industry as defined below.

“The BIOSCIENCE INDUSTRY in SAN ANTONIO includes all organizations that are focused on the research and/or commercialization of innovations that are designed to improve quality of life.”
FOCUS GROUP OUTCOMES

1. Agreed upon definition of Bioscience (See previous page).
2. Established Top Ranked In-Demand Job Categories: Scientist (See page 12) and Technician (See page 15).
3. Established In-Demand Jobs, Special Emphasis Occupation Categories: Engineer, Administrative, IT/Software, Veterinarian/Animal Attendant (See page 18).
4. Scientist positions: Identified discrepancies among job title, seniority, and required education/experience for Scientist roles across local organizations; The roles are in-demand but not difficult to fill due to national searches.
5. Technician positions: Seeking hard & soft skills not cultivated through University training programs; focus group attendees reported significant success from hiring internally through in-house internship programs.
6. Education needs and current state of talent development. Focus Group representatives expressed overall satisfaction with undergraduate and graduate level programs and talent pool; Identified need to expand training at the secondary school level.

The following sections of this report outline areas of focus to address Key Outcomes 2 and 3. By identifying the existing stakeholders in the bioscience ecosystem, we can begin to maximize our investment effectively. In turn, by identifying the education assets and gaps in skill, we can begin to meet industry talent needs head on.
SAN ANTONIO BIOSCIENCE ORGANIZATION ASSET MAPPING

As part of this effort, a thorough inventory and categorization of all bioscience organizations in the region was recorded and “mapped” for reference. The map reflects the current state of the ecosystem and should be considered a snapshot rather than a living and comprehensive list. This study also identified the need to regularly review and update the asset map so it can continue as a tool for economic development and workforce investment decisions.

As is reflected in the asset map on the following page, San Antonio’s bioscience R&D landscape includes universities as well as private nonprofit institutes. The two state universities, UTSA and UTHSA, are key stakeholders in not only growing the workforce pipeline, but also in promoting the development of bioscience innovations through formal education programs and the recruitment of leading bioscience talent. San Antonio also has two private research institutions: SwRI and Texas Biomed. Additional key stakeholders in ecosystem growth are the Department of Defense (DoD) Bioscience Research Laboratories. San Antonio is home to research laboratories for the Army, Navy, and Air Force. These laboratories focus on rapid development of bioscience innovations that align with military medical missions.

KEY OUTCOME #2

The community should invest in the innovation & workforce needs of large organizations within the growing bioscience ecosystem.

San Antonio’s nonprofit R&D organizations should be counted among the prioritized organizations, as they make up the largest portion of market share for both workforce and economic development in the region and serve as “nutrient trees” for the growth of new companies. Just as a large tree consumes nutrients in the soil around it and releases them back into the environment to the benefit of seedlings around it, so does a large organization attract and generate the best of essentials for smaller organizations to grow and thrive.

By investing in the talent and innovation pipelines of its largest organizations, those with more than 50 employees, the San Antonio region can ensure a healthy and strong environment for startups and small companies, further expanding the ecosystem’s potential.
### San Antonio Bioscience Organization Asset Map

<table>
<thead>
<tr>
<th>Industry</th>
<th>R&amp;D</th>
<th>Workforce</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>For-Profit</td>
<td>Education</td>
<td>VC Funding</td>
</tr>
<tr>
<td>Biomedical Enterprise</td>
<td>Brain Sentinel</td>
<td>High School</td>
<td>Fountainhead</td>
</tr>
<tr>
<td>Mission Pharmacal</td>
<td>Evestra</td>
<td>Health Careers</td>
<td>TRTF</td>
</tr>
<tr>
<td>Alamo Biologics</td>
<td>3M / KCI</td>
<td>The Centers for Applied Science and Technology (CAST) Schools</td>
<td>Targeted Technologies</td>
</tr>
<tr>
<td>Bone Bank</td>
<td>Seno Medical Devices, Inc</td>
<td>Fox Tech</td>
<td>Incubators</td>
</tr>
<tr>
<td>Services</td>
<td>Xenex Disinfection Services</td>
<td>STEM Academy @ LEE</td>
<td>Incube Labs</td>
</tr>
<tr>
<td>Biomedical Dev. Corp.</td>
<td>Tissue Regenix</td>
<td>Higher Education</td>
<td>Velocity TX</td>
</tr>
<tr>
<td>Bridge PTS</td>
<td>Nonprofit</td>
<td>UTSA</td>
<td>Technovum</td>
</tr>
<tr>
<td>Cancer Insight</td>
<td>BioBridge Global</td>
<td>UTHSA</td>
<td>Grant Funding</td>
</tr>
<tr>
<td>INCELL Corporation</td>
<td>GenCure</td>
<td>University of the Incarnate Word</td>
<td>San Antonio Medical Foundation</td>
</tr>
<tr>
<td>Startups / Sm. Business</td>
<td>SwRI</td>
<td>Trinity University</td>
<td>SA Partnership in Precision Therapeutics</td>
</tr>
<tr>
<td>Bio2 Medical, Inc</td>
<td>Texas Biomed</td>
<td>St. Mary’s University</td>
<td>Economic Dev. &amp; Advocacy</td>
</tr>
<tr>
<td>BioAffinity</td>
<td>UTHSA</td>
<td>Our Lady of the Lake University</td>
<td>SAEDF &amp; SA Works</td>
</tr>
<tr>
<td>Bluegrass Vascular</td>
<td>UTSA</td>
<td>Palo Alto College</td>
<td>City of San Antonio EDD</td>
</tr>
<tr>
<td>CeloNova Biosciences</td>
<td>DoD</td>
<td>Northwest Vista College</td>
<td>TRTF</td>
</tr>
<tr>
<td>Electrochemical Oxygen Concepts</td>
<td>US Army Institute of Surgical Research</td>
<td>St. Philips College</td>
<td>BiomedSA</td>
</tr>
<tr>
<td>Emtora Biosciences</td>
<td>Navy Medical Research Unit</td>
<td>San Antonio College</td>
<td>The Health Cell</td>
</tr>
<tr>
<td>Luminus Biosciences</td>
<td>Air Force 59MDW</td>
<td>Northeast Lakeview College</td>
<td></td>
</tr>
<tr>
<td>Metric Medical Devices</td>
<td></td>
<td></td>
<td>Staffing</td>
</tr>
<tr>
<td>Prytime Medical Devices</td>
<td></td>
<td></td>
<td>Cherokee Nation</td>
</tr>
<tr>
<td>Rochal Industries</td>
<td></td>
<td></td>
<td>Eagle Medical Services</td>
</tr>
<tr>
<td>StemBiosys</td>
<td></td>
<td></td>
<td>Geneva Foundation</td>
</tr>
<tr>
<td>Olifant Medical</td>
<td></td>
<td></td>
<td>Henry M Jackson Foundation</td>
</tr>
<tr>
<td>Vascular Perfusion Technologies</td>
<td></td>
<td></td>
<td>Metis Foundation</td>
</tr>
<tr>
<td>Neuscience</td>
<td></td>
<td></td>
<td>Parsons</td>
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<tr>
<td>Astrocyte</td>
<td></td>
<td></td>
<td>Aerotek</td>
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<tr>
<td>Renovo Concepts</td>
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<td></td>
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<tr>
<td>Pelican Therapeutics</td>
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<td></td>
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<tr>
<td>Medcognition</td>
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</tbody>
</table>
IN-DEMAND OCCUPATION AREAS

This study identified several In-Demand Occupation Areas from more than 70 job titles provided in response to the question, “Please enter up to 5 most in-demand positions (by job title) for your organization”. In some cases, organizations reported multiple job titles within the same category, for example, an organization may simultaneously recruit for a Research Scientist, Associate Scientist, and Senior Scientist. These categories have been used to further refine the workforce challenges, needs, and outlook of the ecosystem.

The survey also uncovered key Special Emphasis Occupations which include engineers, administrative, and IT/Software Development positions. Though these are not exclusively bioscience job titles, they are in demand and hard to fill. This study revealed that many candidates qualified for these roles may not be aware of opportunity for employment within the bioscience industry. Direct competition with other growing regional industries like cybersecurity and IT naturally drive up demand. Extended efforts should be made to expand recruitment and workforce pipeline development within these special emphasis occupations via increased collaboration across industries and sectors.

<table>
<thead>
<tr>
<th>SCIENTIST POSITIONS</th>
<th>TECHNICIAN POSITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENIOR SCIENTIST</td>
<td>ANALYST</td>
</tr>
<tr>
<td>ASSOCIATE SCIENTIST</td>
<td>CLINICAL SUPPORT TECHNICIAN</td>
</tr>
<tr>
<td>R&amp;D SCIENTIST</td>
<td>SAMPLE ACCESSIONING TECHNICIAN</td>
</tr>
<tr>
<td>SCIENTIST</td>
<td>RESEARCH ASSISTANT</td>
</tr>
<tr>
<td>RESEARCH ASSOCIATE</td>
<td>LABORATORY TECHNOLOGIST</td>
</tr>
<tr>
<td>RESEARCH SCIENTIST</td>
<td>VETERINARY TECHNICIAN</td>
</tr>
<tr>
<td>BIOCOMPATIBILITY SCIENTIST</td>
<td>QUALITY POSITIONS</td>
</tr>
</tbody>
</table>

Above is a representative list of responses within each of the In-Demand Occupation categories identified in the survey. 65% of job titles reported were Scientist Positions and 57% were technician positions confirming that jobs within these categories are high-demand.
**SCIENTISTS WANTED**

71% of respondents indicated a hiring need for at least one scientist role, while 38% cited a need for technicians. Emsi reports that the number of positions in San Antonio for the most frequently reported job titles within the scientist category are 50-67% below the national average and 51-55% below the national average for technician positions.

Other Special Emphasis Occupations were indicated as a hiring need by 66% of respondents, of which, the quantity of jobs available also fell below the national average by a wide range of 17-52%. More research is needed to determine the national and local averages for these roles specifically as they relate to bioscience jobs.

Because the quantity of bioscience positions in San Antonio fall below the national average, it is not surprising that survey respondents indicated a hiring need for these key positions, particularly scientist roles.

<table>
<thead>
<tr>
<th>JOB TITLE / EMSI GROUPING</th>
<th>LOCAL POSITIONS +/- NATIONAL AVG.</th>
<th>LOCAL WORKFORCE</th>
<th>5-YR PROJECTION</th>
<th>LOCAL MEDIAN EARNINGS</th>
<th>NATIONAL MEDIAN EARNINGS</th>
<th>LOCAL POSTINGS/MONTH</th>
<th>NATIONAL POSTINGS/MONTH</th>
<th>TOP HIRING SECTOR</th>
<th>ENTRY-LEVEL EDUCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SCIENTIST</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientists (Except Epidemiologists)</td>
<td>-67%</td>
<td>295</td>
<td>9.4%</td>
<td>$63K</td>
<td>$85K</td>
<td>32</td>
<td>67</td>
<td>Scientific R&amp;D (42.1%)</td>
<td>Doctoral or Professional Degree</td>
</tr>
<tr>
<td>Biological Scientists (All Other)</td>
<td>-50%</td>
<td>417</td>
<td>6%</td>
<td>$77K</td>
<td>$77K</td>
<td>6</td>
<td>16</td>
<td>Federal Government, Civilian (39.4%)</td>
<td>Bachelor’s Degree</td>
</tr>
<tr>
<td><strong>TECHNICIAN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary Technicians &amp; Technologists</td>
<td>+55%</td>
<td>1,422</td>
<td>13%</td>
<td>$32K</td>
<td>$34K</td>
<td>17</td>
<td>12</td>
<td>Other Professional, Scientific &amp; Technical Services (94%)</td>
<td>Associate’s Degree</td>
</tr>
<tr>
<td>Life, Physical &amp; Social Scientists (All Other)</td>
<td>-51%</td>
<td>838</td>
<td>9%</td>
<td>$50K</td>
<td>$49K</td>
<td>50</td>
<td>61</td>
<td>Federal Government, Civilian (22.5%)</td>
<td>Associate’s Degree</td>
</tr>
<tr>
<td><strong>SPECIAL EMPHASIS</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Biomedical Engineering Technicians</td>
<td>-17%</td>
<td>1,002</td>
<td>7%</td>
<td>$60K</td>
<td>$53K</td>
<td>37</td>
<td>44</td>
<td>Federal Government, Civilian (39.7%)</td>
<td>Associate’s Degree</td>
</tr>
<tr>
<td>Biomedical Engineers</td>
<td>-52%</td>
<td>71</td>
<td>7%</td>
<td>$88K</td>
<td>$88K</td>
<td>4</td>
<td>3</td>
<td>Scientific R&amp;D Services (24.3%)</td>
<td>Bachelor’s Degree</td>
</tr>
<tr>
<td>Research Coordinators (Life, Physical &amp; Social Sciences)</td>
<td>-44%</td>
<td>200</td>
<td>10%</td>
<td>$117K</td>
<td>$124K</td>
<td>46</td>
<td>62</td>
<td>Federal Government, Civilian (46.3%)</td>
<td>Bachelor’s Degree</td>
</tr>
</tbody>
</table>

**NOTE:** National average values are derived by taking the national value for a position and scaling it down to account for the difference in overall workforce size between the nation and San Antonio-New Braunfels MSA. In other words, the values represent the national average adjusted for region size. *Source: Emsi.*
Scientist positions represent a broadly defined job category for survey and focus group participants. Across the nation these positions may be titled: Research Scientist, Staff Scientist, Principal Scientist, Senior Scientist, Assistant Scientist, Associate Scientist, Researcher, Scientist I-IV, and sometimes simply: Scientist. In academic institutions, analogous positions may also be titled Postdoctoral Researcher or Faculty. As defined by San Antonio industry leaders, a scientist’s title may vary across institutions and organizations with universal duties.

Survey and focus group responses indicate that duties of bioscience “Scientist” positions commonly include (but are not limited to): laboratory work, data analysis and interpretation, technical writing, and at higher ranks, often include management of other laboratory personnel, oral presentations, and business tasks. Leaders indicate that due to the specificity of research and laboratory tasks to be performed, recruitment and retention of experienced Scientists can be difficult, often requiring national or international searches. Many participants indicated that they recruited scientists most often from UTSA and UT Health San Antonio programs, with less experienced scientists in better supply. Scientists recruited from these organizations and training programs were also described as “strong” candidates.

Below are data from the Emsi Workforce Availability Summary (December 2019) for select positions applicable to Scientists with a specialization in bioscience. The selected positions below are not intended to provide a comprehensive overview of the current bioscience industry in San Antonio, but indicate general growth trends.
REQUIRED EDUCATION & EXPERIENCE

Data presented in charts below was collected from survey respondents encompassing 21 bioscience organizations in San Antonio. Values indicate the percentage of survey responders to define minimum education and experience levels for Scientist positions at their organization. 75% of survey respondents indicated that preferred candidates typically exceed the minimum required education level reported.
DESired SKILLS
Skills reported below were collected from online survey responses and from focus group discussion. Skills reported here are not intended as a comprehensive list, but as a snapshot of ongoing conversation of the bioscience industry needs in San Antonio.

Core Skills:
- Sterile laboratory techniques, including clinical & preclinical experience
- Laboratory terminology
- Technical writing
- Interpretation of technical reading
- Knowledge of statistics & statistical software
- Ability to prepare figures & presentations
- Analytical skills & ability to interpret data

Bonus Skills:
- Strong verbal and written communication
- Ability to work independently and in groups
- Ability to present findings to large groups
- Business proficiency
- Goal driven, interest/curiosity in line of work

Top Desired Skills

1. Clinical/Preclinical skills
   - Mathematical knowledge
   - Advanced cell culture

2. Communication
   - Teamwork

3. Critical Thinking
   - Verbal presentation
Technician positions also represent a broadly defined, high-demand job category for study participants. Across the nation Technician positions within Life, Physical and Social Sciences, may be titled: Laboratory Technician, Laboratory Technologist, Laboratory Analyst, Clinical Laboratory Technologist, Medical Laboratory Technologist, Laboratory Assistant, Research Assistant, Laboratory Analyst, or simply: Technician or Technologist. Industry leaders also identified a need for Animal Care Technicians and Veterinary Technicians. As defined by participants, “Technician” may vary across institutions and organizations, but as with scientists, technicians share a universally understood set of duties. Bioscience Technician positions commonly include (but are not limited to): Laboratory work under the direction of lead scientists and adherence to regulatory standards. While specific education levels or training specialties are often not required for Technician positions, any prior experience in scientific laboratories through research or internships was cited as highly desired.

Below are data from the Emsi Workforce Availability Summary (December 2019) for select positions applicable to Technicians with a specialization in bioscience. The selected positions below are not intended to provide a comprehensive overview of the current bioscience industry in San Antonio, but indicate general growth trends.
REQUIRED EDUCATION & EXPERIENCE

Data presented in charts below was collected from survey respondents encompassing 21 bioscience organizations in San Antonio. Values indicate the percentage of survey responders which identified each education level and years of experience as a minimum requirement for Technician positions at their organization. 62% of survey respondents indicated that preferred candidates for the role of Technician exceed the minimum required education level reported.
DESIRED SKILLS
Skills reported below were collected from online survey responses and from focus group discussion. Skills reported here are not intended as a comprehensive list, but as a snapshot of ongoing conversation of the bioscience industry needs in San Antonio.

CORE SKILLS
● Laboratory skills
● Laboratory safety
● Data interpretation
● Regulatory knowledge
● Experience with animal models & care
● Inventory & receiving

BONUS SKILLS
● Ability to work in teams
● Communication
● Computer skills
● Flexible
● Problem-solving

TOP SKILLS

1. Basic Lab Skills
   - Data Analysis/Interpretation

2. Critical Thinking
   - Communication
   - Teamwork

3. Computer Skills
   - Flexibility
Several jobs outside of Scientist or Technician positions were identified as “in demand.” Though these jobs are not exclusive to the bioscience industry, they are critical. Several participating organizations reported high demand for engineers, administrative, and IT positions to support their efforts. Veterinary Technician and Animal Care Specialists, though included in the “Technician” section of this report, were also identified as difficult to fill Special Emphasis Occupations. Respondents cited a lack of awareness of opportunity in the bioscience industry in these roles as the reason behind recruitment and turnaround challenges.

Proposed solutions for improved recruitment and retention of Special Emphasis Occupations include competitive pay rates and improved marketing of available positions in the San Antonio bioscience sector through technical trade shows (both for community and K-12 emphasis) and increased collaboration with local education providers. See Page 27 for more detail.

"HARD TO FIND ELECTRICAL, SOFTWARE, & COMPUTER ENGINEERS WITH MEDICAL DEVICE EXPERIENCE IN SAN ANTONIO."

Quotes related to Special Emphasis Occupations taken from 2019 San Antonio Bioscience Workforce Needs Survey.
EDUCATION PROVIDERS

San Antonio education providers are well positioned to meet the needs of the current bioscience industry. Survey respondents repeatedly listed local universities as key sources of both Scientist and Technician positions, but there was a call for more communication between employers and education providers at all levels.

FOCUS GROUP HIGHLIGHTS

1. The talent being sourced from local institutions is well prepared. Discussion included a focus on UTSA and UT Health SA as feeder organizations with an additional focus on the joint Biomedical Engineering program.
2. Existing programs meet the needs of the bioscience employers surveyed, with the exception of highly specialized roles.
3. With a 75% conversion rate, employers expressed a need for increased internship opportunities.

"COMMUNICATION BETWEEN THE INDUSTRY EMPLOYERS, INSTITUTIONS OF HIGHER EDUCATION, GRADE 6 - 12 EDUCATIONAL INSTITUTIONS TO SHARE NEEDS AND MEET DEMANDS."

The education providers outlined in this report represent research intensive institutions (i.e. UT Health SA) as well as undergraduate teaching institutions (i.e. Trinity University). The following pages highlight data that provide a clear overview of the talent pipelines being created by local institutions. These pipelines should be supported by employers through communication with institutions in an effort to promote awareness of opportunities and ongoing adaptation of programming to meet the changing workforce needs of the industry.

KEY OUTCOME #3

Economic development efforts should prioritize recruitment of large bioscience organizations.

Key outcomes one and two led to a streamlined definition of bioscience in San Antonio and an increased focus on large organizations, “nutrient trees” with depth of resources and talent (more than 50 employees). By investing in these organizations and developing the workforce pipeline for all levels of in demand positions, the asset base in the region is strengthened, thereby creating an attractive prospect for additional large organizations to establish a presence in the San Antonio bioscience ecosystem. By narrowing the focus of which companies fall into the defined industry and selling a strong asset base, the economic development community can successfully recruit additional large organizations.
SAN ANTONIO BIOSCIENCE EDUCATION PROVIDER ASSET MAP

The map represents a snapshot of the bioscience education providers in San Antonio. Direct contact with providers and public sources were used. The map is not a comprehensive list and it is recommended that the bioscience community update these resources regularly.

<table>
<thead>
<tr>
<th>PROVIDER</th>
<th>AS</th>
<th>BS</th>
<th>MS</th>
<th>PHD</th>
<th>NIH, NSF LABS ON CAMPUS</th>
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WORK-BASED LEARNING AND LABORATORY INTERNSHIP OPPORTUNITIES

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<tr>
<th>PROVIDER</th>
<th>TEACHER OPPORTUNITIES</th>
<th>MS/HS INVOLVEMENT*</th>
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<th>UNDERGRAD</th>
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*Work Based Learning Opportunities including Job Shadow, Summer Camp etc.
FOUR-YEAR PROGRAMS

UNIVERSITY OF TEXAS HEALTH AT SAN ANTONIO (UT HEALTH SA)

UT Health San Antonio (formerly the UT Health Science Center at San Antonio) is a public university within the University of Texas System institutions. UTHSA offers over 70 degree specialties across its five schools of: Medicine, Nursing, Dentistry, Health Professions, and the Graduate School of Biomedical Sciences (GSBS). The Graduate School offers 18 masters (MS) or doctoral (PhD) level training programs for future professionals within the field of biomedical science.

UTHSA is home to these core research facilities Bioanalysis and Single Cell, Biobanking and Genome Analysis, Biomolecular NMR, Flow Cytometry, Macromolecular Interactions, Mass Spectrometry, Optical Imaging and X-Ray Crystallography, Research Imaging Institute, Greehey Children’s Cancer Center, and South Texas Research Facility (see appendix) capable of preparing scientists for careers in interdisciplinary basic science and clinical research.

TRAINING PROVIDER TYPE:
Public Graduate/Professional School

BIOSCIENCE DEGREES OFFERED:
- Doctorate of Medical Physics (DMP)
- Biomedical Engineering (MS, PhD)
- Radiological Sciences (PhD)
- Translational Science (PhD)
- Medical Scientist (MD-PhD)
- Cell Systems & Anatomy (MS)
- Clinical Investigation & Transl. Sci (MS)
- Immunology & Infection (MS)
- Medical Health Physics (MS)
- Personalized Molecular Medicine (MS)
- Integrated Biomedical Science, multiple disciplines (PhD)- Biochemical Mechanisms in Medicine; Biology of Aging, Cancer Biology; Cell Biology, Genetics, and Molecular Medicine; Molecular Immunology & Microbiology; Neuroscience; Physiology and Pharmacology

AVERAGE COMPLETION TIME:
- 3 years for Masters programs
- 5.5 years for PhD program

GRADUATION:
- Masters and PhD graduation rates 79% and 63% respectively
- 69 Masters and PhD degrees awarded in Spring 2019 commencement

AVERAGE COST:
- Standard in-state and out-of-state tuition rates apply
- Many fellowships/assistantships available for PhD

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
The Office of Career Development provides innovative career and professional development resources for UTHSA students. Programs include strategic national and community partnerships that inform the development of professional development workshops, networking opportunities, and outreach programs for graduate trainees. The Office of Career Development is also home to the Career Advisory Council, which is comprised of leaders in the biomedical science community of San Antonio who provide insight and expertise to graduate trainees at UT Health San Antonio.
UNIVERSITY OF TEXAS AT SAN ANTONIO (UTSA)

The University of Texas at San Antonio is a multicultural discovery enterprise institution with more than 32,000 students. It is the largest university in the San Antonio metropolitan region with four campuses across the city, and the eighth largest university in Texas. UTSA is a growing community with intentions to expand to over 45,000 students by 2028. UTSA provides a wide variety of quality programs and services designed to support student success and enrich learning and living experiences. Faculty and staff are committed to helping students reach their educational, personal and professional aspirations with one-on-one interaction and personal instruction. Experiential classroom-to-career opportunities enhance the learning experience and open doors for students.

UTSA is home to both a College of Engineering and a College of Sciences which offer numerous degree programs to students interested in bioscience.

TRAINING PROVIDER TYPE:
Public 4-year University

BIOSCIENCE DEGREES OFFERED:
- Biochemistry (BS)
- Biology (BS, MS)
- Biomedical Engineering (BS, MS, PhD)
- Biotechnology (MS)
- Biotech Commercialization* (beginning 2020)
- Cell & Molecular Biology (PhD)
- Chemical Engineering (BS)
- Chemistry (BS, MS, PhD)
- Health (BS)
- Microbiology & Immunology (BS)
- Multidisciplinary Science (BS)
- Neuroscience (BS)
- Neurobiology (PhD)
- Translational Science (PhD)

AVERAGE COMPLETION TIME:
Four-year programs: 21.8% within 4 years, 36.9% within 5 years, 42.2% within 6 years

GRADUATION:
733 Bachelors, 100 Masters, and 26 PhD degrees awarded (2018-2019)

AVERAGE COST:
Standard in-state and out-of-state tuition rates apply

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
UTSA has an on-campus University Career Center to assist students and alumni in identifying and developing the global skills necessary to successfully pursue and achieve lifelong career goals. The Career Center provides numerous opportunities for students to build career-related skills and connect with employers through career events. Students benefit from faculty encouragement to participate in these events. Faculty members also frequently attend career fairs to meet recruiters and stay current on employment trends. The Career Center offers many workshops that can be hosted for Student Organizations.
OUR LADY OF THE LAKE UNIVERSITY

Our Lady of the Lake University (OLLU) offers students more than 75 undergraduate, master’s level, and doctoral degree programs in an intimate campus environment. By redesigning general education requirements, OLLU has made it possible for students to earn a double major or double minor in the time it takes to earn one major at other universities. Students may also pursue accelerated bachelor’s to master’s programs in selected areas of study. Relevant to careers in bioscience, OLLU offers degrees in biology, biomathematics, chemistry and chemical biology. The bachelor’s degrees in biology prepares students for graduate school, medical school, and careers in the health professions, environmental science, teaching, and research. Students can complete research projects with faculty and other classmates and present at local or national conferences. The Chemical Biology degree provides students with training in both chemistry and biology so that they may understand and investigate the chemical processes that take place in living systems. The combination of the two disciplines alleviates the strain associated with obtaining a double major in chemistry and biology and provides a strong background for students interested in molecular biology, biochemistry, pharmacology, medicinal chemistry, biotechnology or forensic chemistry.

TRAINING PROVIDER TYPE:
Private 4-year University

BIOSCIENCE DEGREES OFFERED:
- Biology (BA, BS)
- Biomathematics (BS)
- Chemistry (BA, BS)
- Chemical Biology (BS)

AVERAGE COMPLETION TIME:
- For the 2018-2019 academic year, 21% of students enrolled in four-year programs graduated within four years
- For the 2018-2019 academic year, 37% of students enrolled in four-year programs graduated within six years

GRADUATION:
- For the 2017-2018 academic year, 287 Bachelor’s degrees were awarded
- 548 Master’s and 28 PhD degrees were awarded

AVERAGE COST:
- Estimated cost of attendance for 2019-2020 academic year for commuter students $30,418
- Rated #1 for affordable tuition among San Antonio private universities

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
OLLU has an on-campus office for Career Development Services. The office offers services including career advising, online career assessment and career planning through FOCUS2, resume development, interview preparation, career mapping, and loans of interview attire through the Career Closet program. Career Development Services also offers numerous services through the online platform Handshake for access to internship and job posting, scheduling of advising appointments, registration for career events, and more.
ST. MARY’S UNIVERSITY

Founded in 1852, St. Mary’s University is the oldest Catholic university in Texas and the American southwest. Currently serving 2,373 enrolled undergraduate students, St. Mary’s offers more than 75 undergraduate, graduate, and law programs. Relevant to bioscience careers, St. Mary’s offers training programs in biology, bioinformatics, biochemistry, and chemistry. The study of Biological Sciences at St. Mary’s University includes a broad-based curriculum designed to prepare well-rounded health care professionals, research scientists and educators. In addition to extensive scientific training, students develop written and oral communication skills, critical thinking and analytical skills, as well as an understanding of and respect for ethical and moral considerations. The Biochemistry program at St. Mary’s University introduces students to the chemistry of living organisms. It provides excellent preparation for medical, dental, veterinary and allied health schools, as well as for students who choose to pursue graduate degrees in biochemistry, molecular biology or pharmacy, or careers in biochemistry and biotechnology.

TRAINING PROVIDER TYPE:
Private 4-year University

BIOSCIENCE DEGREES OFFERED:
● Biochemistry (BS)
● Bioinformatics (BS)
● Biology (BA, BS)
● Chemistry (BA, BS)

AVERAGE COMPLETION TIME:
● For four-year programs, 44% of first time in college (FTIC) students graduate within four years, and 56% of FTIC students graduated within six years

GRADUATION:
● 479 Bachelor’s degrees were awarded (2017-2018)
● 198 Master’s and 5 PhD degrees were awarded (2017-2018)

AVERAGE COST:
The 2019-2020 estimated undergraduate annual cost of attendance for off-campus students is $40,440

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
STRIVE Career Center at St. Mary’s University — Successful, Transformative Results from Innovative Vocational Experiences — engages campus and community partners to provide vocational and experiential education opportunities for our students. These innovative programs engage alumni, parents, faculty, staff, employers and citizens of the community in strategic partnerships. STRIVE offers employers numerous opportunities to connect and recruit St. Mary’s students through programs such as Rattler Careers, job and professional school fairs, on-campus interviews, information tables/session, and facilitation of employer presentations to classes and registered student organizations.
TRINITY UNIVERSITY

Trinity University is a private liberal arts and sciences university with 2,480 students enrolled annually. Trinity has more than 250 full-time faculty members with a student-to-faculty ratio of 9:1. 97% of faculty hold doctoral or terminal degrees. With 49 majors, Trinity students today will have the opportunity to move between jobs and careers, and assume leadership positions at every level.

Relevant to training in bioscience, Trinity is home to the departments of Biology and Chemistry. The Department of Biology engages and supports students in a dynamic learning environment that promotes a broad, integrated, and interdisciplinary understanding of biological systems. We value and mentor students as colleagues in inquiry, blurring the lines between scholarship and teaching. The biology department also facilitates numerous research opportunities for undergraduates, including volunteer research activities for course credit. The hallmarks of Trinity’s chemistry program are its innovative and progressive curriculum, student exposure to modern sophisticated instrumentation, and a strong emphasis on undergraduate research, all of which prepare students for advanced degrees and careers at some of the country’s best graduate schools, medical schools, and corporations.

TRAINING PROVIDER TYPE:
Private 4-year University

BIOSCIENCE DEGREES OFFERED:
- Biochemistry (BS)
- Biochemistry & Molecular Biology (BS)
- Biology (BS)
- Chemistry (BA, BS)
- Neuroscience (BS)

AVERAGE COMPLETION TIME:
76% of students in 4-year programs graduate within six years

GRADUATION:
- 462 Bachelors awarded 2016-2017
- 97 Masters
- 91% graduation rate

AVERAGE COST:
$44,680 tuition and fees annually

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Career Services at Trinity is a comprehensive and centralized service that works with both students (from first-years to seniors) and alumni. The office specializes in assisting students and alumni to evaluate their interests and skills, to set goals, and to research majors and occupations in light of interests, skills, and goals. Career Services offers a variety of services and workshops, including Hire A Tiger, an online recruitment system. The staff of Career Services also works closely with employers and recruiters to develop recruiting relationships and assist students to have access to jobs, internships, and employer information targeted specifically to Trinity students and graduates. Career Services also works closely with the Alumni Career Network. A group of over 500 Trinity Alumni who have volunteered to assist students and other Trinity graduates to access networks that can assist them to move forward with their career plans.
UNIVERSITY OF THE INCARNATE WORD

University of the Incarnate Word (UIW) is a private, Catholic university that was founded in 1881. UIW has a total undergraduate enrollment of 5,558 and offers 90 undergraduate programs, 23 intercollegiate sports, and opportunities for service learning and global study.

Relevant to bioscience careers, UIW offers multiple undergraduate and graduate training programs within biology, biomedical science, and health related fields. The biology degree program incorporates a broad range of disciplines including evolution, cellular and molecular biology, genetics, topics in animal and human physiology, microbiology and ecology. The master’s degree in Biology is a terminal degree that professional requirements and also serves as a bridge towards the doctoral degree. The Master of Biomedical Science (MBS) program is a one-year, 37-credit hour program designed to enhance the scientific knowledge of students who desire to pursue a professional degree in the biomedical sciences or in health care professions including medicine, dentistry, pharmacy, physical therapy, and optometry. The curriculum integrates science, research, bioethics and medical humanities, culminating into a final capstone project. The Bachelor of Science in Health Sciences, offered online, is designed for students who are ready to prepare for a career in the healthcare field or to move up to a senior leadership position if the student is a healthcare professional.

TRAINING PROVIDER TYPE:
Private 4-year University

BIOSCIENCE DEGREES OFFERED:
- Biochemistry (BS)
- Biology (BA, BS, MA, MS)
- Biomedical Science (MBS)
- Chemistry (BA, BS)
- Health Science- General Studies (BS)
- Nuclear Medicine (BS)

AVERAGE COMPLETION TIME:
- Bachelor’s level programs are designed for average 4-year completion
- Master’s level programs are designed for average 2-year completion
- 1,138 graduates (AS to PhD) in 2019

GRADUATION:
26% within four years, 49% within six years for first time in college full-time undergraduate students (2018)

AVERAGE COST:
- $34,445 per year for in-state, off campus undergraduate students
- $960 per credit hour for Master’s programs

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
UIW has an on-campus Career Services office which includes services in individual career counseling, personality and career assessment, resume and cover letter review, career-related workshops, and programs to assist with the necessary skills needed for post-graduation success. In addition, UIW fosters relationships with campus departments and external employers to enhance internship job and career opportunities during the student lifecycle and beyond.
TEXAS A&M SAN ANTONIO

Founded as the first upper-division institution of higher education in South San Antonio, Texas A&M University-San Antonio (A&M-SA) today is a comprehensive four-year university offering affordable, high-quality education. The University currently serves nearly 6,500 students and has graduated more than 8,000 alumni. Through the University’s 26 undergraduate degrees and 13 graduate degrees, students can pursue a wide variety of in-demand fields. The Department of Science and Mathematics (SaM) at Texas A&M-SA consists of the program areas offering bachelor degrees in Biology, Mathematics, Psychology, and Water Resources Science and Technology, with support from Physical Sciences (Chemistry, Geography, Geology, and Physics). Project-based learning occurs via directed research opportunities pursued by students working directly with professors on topical research problems. Degree programs prepare students for direct entry into the workplace, teacher certification, or preparation for graduate or other professional school programs (e.g. medical school, dental school, and other allied health-related programs). The university also developed a special committee of faculty to advise students interested in health-related careers, i.e. the Health Professions Advisory Committee (HPAC). This committee guides our students on the pathway to health professions careers.

TRAINING PROVIDER TYPE:
Public 4-year University

BIOSCIENCE DEGREES OFFERED:
- Biology (BA, BS)
- Biology- Cell & Molecular Biology (BS)

AVERAGE COMPLETION TIME:
Bachelor’s programs are designed for four-year completion

GRADUATION:
- 64.8% of students from the 2012 entry year graduated within four years
- Science & Math Bachelor’s degrees awarded in 2018: 153

AVERAGE COST:
- $23,422 per year for in-state students living off campus
- Additional cost of attendance estimates available at tamusa.edu/financialaid/costofattendance

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Career Services staff within the Mays Center for Experiential Learning & Community Engagement prepares students for real life objectives and expectations regarding careers and employment through the use of innovative research and learning techniques. The center provides quality counseling in the areas of choosing a major, job search strategies, pursuing employment and graduate school opportunities.
COMMUNITY COLLEGES

PALO ALTO COLLEGE

Palo Alto College is one of five separately accredited colleges in the Alamo College District. Founded in 1985, Palo Alto College has served over 100,000 individuals throughout San Antonio, Bexar County, and surrounding counties. Relevant to bioscience careers, Palo Alto College offers an Associate of Science in Biology to present students with scientific methodology and fundamental principles of biology in preparation for professional careers. Palo Alto College also offers an Associate of Science in Chemistry which allows students to pursue a bachelor’s degree in chemistry or professional training in the fields of dentistry, medicine, or pharmacy.

TRAINING PROVIDER TYPE:
Public Community College

BIOSCIENCE DEGREES OFFERED:
- Biology (AS)
- Chemistry (AS)

AVERAGE COMPLETION TIME:
- The Associate of Science degree is designed to align closely with the first half of a BS degree
- Associate’s programs require 60 credit hours, approximately 2 years

GRADUATION:
- For First Time in College (FITC) students in 2013, graduation rates for full time and part time students were 29.6% and 18.7%, respectively
- 20.2% of FITC students transferred to a Texas Senior institution in 2017

AVERAGE COST:
$41,604 estimated cost for 2-year degree

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Palo Alto College has on campus career services which offer preparation services for students including mock interviews, resume writing assistance, and career exploration. PAC Career Services, within AlamoSync, features additional details on upcoming career related events as well as job and internship boards. The Goodwill Clothing Closet is available to currently enrolled students through a partnership with Goodwill Industries of San Antonio. Students can receive free professional clothing for interviews, networking events, or internships.
NORTHWEST VISTA COLLEGE

Northwest Vista College began offering classes in the fall of 1995 as one of the newest additions to the Alamo Colleges District. As of 2016, there are over 18,000 students taking courses at Northwest Vista College and several off-site locations in a traditional daytime classroom setting as well as evening, Internet, hybrid and weekend courses. Most of the classes offered lead to a two-year associate degree or one-year certificate option. Relevant to bioscience careers, Northwest Vista College’s Biology Field of Study (FOS) program includes a selection of lower-division courses that are guaranteed by state law to transfer and apply to a degree program. Northwest Vista College also offers an Associate of Applied Science degree for Clinical Research Coordinator- a career identified as a special emphasis occupation within San Antonio’s bioscience industry. The Clinical Research Coordinator program prepares students for careers managing research studies conducted in the development of new drugs and medical devices.

TRAINING PROVIDER TYPE:
Public Community College

BIOSCIENCE DEGREES OFFERED:
- Biology (FOS)
- Clinical Research Coordinator (AAS)

AVERAGE COMPLETION TIME:
- Field of Study (FOS) and Associate of Applied Science (AAS) degrees are designed to average 2-year completion

GRADUATION:
- 50% transfer rate
- 29.4% graduation rate within 150% of average completion time

AVERAGE COST:
$36,244 estimated cost for 2-year degree

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Northwest Vista College has an on-campus Career and Transfer office to pinpoint career paths for students to explore. Services offered include career and interest assessments, and self-paced career and educational program through Focus2 to assess students’ skills, values, and interests. The Career and Transfer Services “Career Coach” Tells students how the education that colleges of Alamo Colleges District provide will lead to careers that interest you. This user-friendly web-based tool markets careers and programs by providing valuable information on how wages, trends, and careers connect to education and training locally (within a 50-mile radius of San Antonio).
ST. PHILLIPS COLLEGE

St. Phillips College, founded in 1898, is one of five separately accredited colleges in the Alamo College District. St. Phillips College currently serves more than 11,000 students in over 70 different academic and technical disciplines. Relevant to careers in bioscience, St. Phillips College offers an array of training programs in preparation for distinct careers as scientists or technicians. The biology and chemistry Associate of Science (AS) programs provide strong theoretical content offering with equally thorough laboratory sessions and prepare students to successfully transition to further careers in industry or academia. Degree and certificate level training for Associate of Applied Science (AAS) are offered for Biomedical Engineering Technology and Medical Laboratory Technician (MLT). The MLT program prepares Health Science professionals to perform analysis on blood and body fluids to enable a physician to diagnose and monitor the treatment of diseases. The MLT program helps students obtain marketable skills for entry-level positions. Graduates earn an Associate of Applied Science Degree. The program satisfies entry-level skill requirements and provides a foundation for career advancement. The Biomedical Engineering Technology (BET) program is designed for students who desire a career in the Healthcare Technology Management fields with a focus on medical devices. The program provides students with hands-on training in medical hardware and software to meet the growing demand for professionals who can manage, modify, repair, design, and test, and upgrade medical devices. The BET program prepares students for several careers within engineering and equipment technology.

TRAINING PROVIDER TYPE:
Public Community College

BIOSCIENCE DEGREES OFFERED:
- Biology (AS)
- Biomedical Engineering Technology (AAS)
- Medical Laboratory Technician (AAS)
- Chemistry (AS)

AVERAGE COMPLETION TIME:
Degrees are designed to average 2-year completion

GRADUATION:
- 26.4% graduation rate within three years for First Time in College (FTIC) students in 2017
- 2018/2019 Degrees Awarded
  - 133 Biology (AS)
- 13 Medical Laboratory Technician

AVERAGE COST:
$36,244 estimated cost for 2-year degree

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
St. Phillips College has an on-campus career services center with an array of professional services to assist students with career planning and career development needs throughout enrollment. Services include: Strategic Job Search, resume & cover letter review, STAR Interview Prep, mock interviews, Dress for Success, and networking. Through workshops, career fairs, and employer panel events, students will gain insight into what employers are looking for in top candidates.
SAN ANTONIO COLLEGE

San Antonio College is one of the five Alamo Community Colleges and serves over 20,000 students per semester. San Antonio College is the largest single-campus community college in Texas and one of the largest in the United States. In support of the mission of the Alamo Community College District, San Antonio College responds to Bexar County’s diverse community by providing high quality general education, liberal arts and sciences, career education, continuing education and developmental education.

Relevant to careers in bioscience, San Antonio College offers Associate’s degrees in chemistry and several sub-disciplines of biology. To adapt to the evolving needs of the industry, the department of biology has eight distinct degree plans and is in the process of negotiating articulation agreements with four neighboring institutions.

TRAINING PROVIDER TYPE:
Public Community College

BIOSCIENCE DEGREES OFFERED:
- Biology: General, Pre-Nursing, Pre-Pharmacy, Pre-Professional (AS)
- Chemistry (AS)

AVERAGE COMPLETION TIME:
Degrees are designed to average 2-year completion

GRADUATION:
- 14% graduation rate and 61% transfer-out rate when given 150% of the time needed to complete an associate degree for full-time, first-time degree-seeking students
- 6 Associate of Science degrees awarded in 2019

AVERAGE COST:
$18,122 estimated annual cost for independent, in-district students

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Career Services at San Antonio College offers assistance with exploring careers, researching career paths, seeking internships, creating a resume, and/or job searching. Career Services also collaborates with local employers by providing access to our job bank to post positions. Career advising/services can assist with: exploring skills and interests, developing a career plan, employment opportunities, conducting an effective job search, gaining hands on experience with internships or work, and developing a resume, cover letter and/or interview techniques.
NORTHEAST LAKEVIEW COLLEGE

Northeast Lakeview College is the newest of the five Alamo Community College District. Established in partnership with its communities, Northeast Lakeview College is focused on student success through the offering of Associate degrees and continuing education, promoting engagement in civic activities and organizations, and encouraging participation in cultural and enrichment programs.

Relevant to careers in bioscience, Northeast Lakeview College offers Associate’s degrees in chemistry and several sub-disciplines of biology. Students studying biology will be prepared to transfer to a university and pursue a Bachelor’s Degree.

TRAINING PROVIDER TYPE:
Public Community College

BIOSCIENCE DEGREES OFFERED:
- Biology: General, Pre-Nursing, Pre-Pharmacy, Pre-Professional (AS)
- Chemistry (AS)

AVERAGE COMPLETION TIME:
Degrees are designed to average 2-year completion

GRADUATION:
- 23.3% of students graduated within three years (2018)
- 78 Associate of Science degrees awarded in 2019

AVERAGE COST:
$18,122 estimated annual cost for independent, in-district students

POST-COMPLETION JOB PLACEMENT AND EMPLOYMENT SUPPORT:
Northeast Lakeview College has an on-campus Career Services and Job Placement Center. The mission of the Career Services and Job Placement Center is to support the institution’s academic programs by designing, implementing, and managing services and programs that meet the career and educational development and employment needs of the students. The center offers programs including: career exploration through FOCUS 2-Career and Education Planning, online career coach tool, and job/internship placement resources.
SOLUTIONS & RECOMMENDATIONS

1. RESEARCH & INFO SHARING
   ✓ Establish collaborative efforts to understand the workforce needs of large bioscience organizations.
   ✓ Build relationships to learn more about Military / Government research organizations and their talent needs.
   ✓ Ensure ongoing discussion of workforce initiatives among industry and academic partners.
   ✓ Leverage Workforce Advisory Council, SAEDF Bioscience Working Group, and SAMMI position to strengthen SA Works Jobs Report and program / curriculum recommendations.

2. MARKETING
   ✓ Integrate marketing and communication efforts between bioscience advocacy and economic development organizations to promote San Antonio as a regional/national hub for Bioscience.
   ✓ Align recruitment and retention efforts.
   ✓ Create a forum or platform to regularly update and share San Antonio Bioscience Organizations and Education Providers Asset Maps, key messages, and outreach plans.

3. EDUCATION PROGRAMS
   ✓ Align STEM education and outreach efforts.
   ✓ Create a STEM Education Ecosystem Asset Map in collaboration with the Alamo STEM Ecosystem.
   ✓ Continue to create tailored collegiate bioscience programs. Example: UTSA’s College of Engineering and College of Business plan to launch a joint master of science degree program in biomedical technology commercialization, beginning in the spring 2020 semester.
   ✓ Establish high school-to-career programs tailored to bioscience career paths.
   ✓ Promote the creation and advertisement of Bioscience Internships with standardized policies defined in collaboration with SA Works.

4. EXTEND REACH
   ✓ Efforts should be made to facilitate collision opportunities with regional large R&D institute partners such as Texas State and Texas A&M.
   ✓ Further explore DoD and national collaboration opportunities.

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**CASE STUDIES**

1. GROW BIOSCIENCE INDUSTRY AWARENESS AND WORK EXPERIENCE OPPORTUNITIES

The 2018 Future Workforce Survey[^4] completed by McGraw-Hill found that fewer than half (41%) of college students feel well-prepared for their future careers. Interestingly, 51% of students reported that “more internships and professional experiences” would have made them feel more prepared.

It is clear that internships are a great way to train future generations for the workforce however, there are often barriers faced that some cannot overcome. For example, San Antonio is the 7th largest city in the United States and has the largest Hispanic population in a Hispanic-majority city. Hispanics account for half of the country’s growth in the last decade with college enrollment of Hispanics at an all-time high. Yet, Hispanics are underrepresented at all levels of the scientific community and workforce. Could internships that are made attainable to this key population help to close this gap? Could San Antonio lead the way in promoting diversity within the bioscience workforce?

One potential option is to explore the expansion and creation of micro-internships, or semester-long internships that are designed to help narrow the internship access gap. The Micro-internship is a short-term, paid, professional assignment usually consisting of 5 to 40 hours of work, and can occur any time of year. They are highly-specific, project-based positions. In other models, students receive a fixed fee, typically equating to $15 to $25 per hour, and are given between one week and one month to complete their project.[^5]

"OF THE INTERNS AT OUR ORGANIZATION, APPROXIMATELY 50% ARE HIRED INTO A FULL-TIME ROLE AFTER GRADUATION. WE NEED TO ENSURE WE ARE PROVIDING INTERNSHIPS THAT ARE ATTAINABLE TO MORE STUDENTS AND AS DIVERSE AS POSSIBLE."

-- FOCUS GROUP PARTICIPANT

Another option is to continue to expand the awareness of local internships within organizations like Texas Biomed, UT Health San Antonio, and our local bioscience industry partners such as 3M/KCI. This can be done in part through sharing information about internship programs with advocacy organizations like SA Works, BioMedSA and others as well as the San Antonio Colleges and Universities Career Centers Association (SACUCCA), a cooperative network of Career Services offices representing fourteen colleges and universities in the greater San Antonio area.[^6]

[^6]: https://www.sacucca.org
2. INCREASE AWARENESS OF THE BIOSCIENCE INDUSTRY

San Antonio’s bioscience sector is growing at a steady pace. Projections show that in the near future there will be an increased demand for a bioscience workforce with a variety of education and skill levels. The Inaugural Bioscience Workforce Summit will convene bioscience industry employers, educational institutions and workforce members to establish lines of communication and regular collaboration between all stakeholders.

The objectives, format and content of the summit are being developed by a working group that will consider current bioscience workforce data to organize and execute a 2020 Bioscience Workforce Summit. The intent is to engage in an exchange of workforce needs, opportunities, challenges and solutions across the bioscience sector.

Industry stakeholders with an interest in participating as speakers, panel members and workforce outreach will have the opportunity to share their current initiatives, accomplishments and needs for the purpose of deepening connections and initiating a process of creating strategies to fill critical skills gaps, enable a more efficient and effective workforce, and deliver the best talent possible in order to grow our City’s bioscience ecosystem.

The summit will benefit future workforce members by presenting a look at the jobs that industry employers have identified as coming available in the near future along with the education and skills required for those jobs. Area high school students will learn about the educational programs and internships available to acquire the targeted education and skills. Breakout sessions will be conducted to prepare them for entering the workforce. A separated component of the summit will bring incumbent workers to learn of current demand occupations, skill level requirements and educational opportunities. This outreach will provide the opportunity to connect job applicants to employers.

By bringing together bioscience employers, educators and workforce the Summit will meet current needs and catalyze the continued sharing of opportunities.
3. San Antonio Private Sector Leadership and Talent-Driven Solutions

There are great examples of how organizations can work internally and externally with ecosystem partners to expand workforce strategies and build the workforce they need. One example can be found in BioBridge Global. Early this year, 2019, BioBridge Global embarked on a journey with the objective of preparing the workforce for the challenges the enterprise will face in the years to come. BioBridge has been able to accomplish a great deal through the completion of three significant projects: Workforce Capabilities, Career Progression Framework, and Leadership Organizational Readiness (see diagram above).

Workforce Capabilities Project: The goal of this project was to develop tomorrow’s workforce requirements at BioBridge Global with a focus on the highly skilled, STEM-prepared, technician/technologies and the people who have the capacity to become such. The approach involved an internal BioBridge Global task force team, outside stakeholders, and educational institutions (as needed) to identify current/future workforce capabilities along with a gap assessment. This was done via a series of guided workshops over three phases, workforce capability assessment, solution design, and solution refinement. This project resulted in an approved internal prioritized capability gap assessment that includes job descriptions impacted and required updates, established partnerships with local workforce development organizations and other Bioscience organizations, and a proposed implementation solutions/approaches leading to a sustainable skilled workforce pipeline.

Career Progression Framework: In order to ensure transparency of job paths for existing talent BioBridge has created a career progression framework that allows all employees to see all possible paths forward for them and for others within the organization. The goal of this project is to promote retention and expand opportunities to upskill current staff.

The Leadership Organizational Readiness (LOR) program was designed as an annual opportunity for executives and directors to identify successors for key roles and to reflect on the emerging talent in our organization. As a result of the annual LOR exercise, internal promotions have increased by 10-15% in the past three years. Additionally, our internal leadership development programs have expanded to include an executive mentoring program, a developmental coaching program and other opportunities to nurture our internal talent.
4. **Expand existing infrastructure to grow bioscience Middle skill workforce (Technician Positions)**

San Antonio is home to several workforce advocacy and support organizations such as Goodwill San Antonio Good Careers Academy\(^7\), the Alamo Academies Health Professions Academy\(^8\), and Project Quest\(^9\). Project QUEST has the potential for further expansion to support the bioscience sector and was brought to light through engagement with bioscience industry leadership. Project QUEST strengthens the economy and transforms lives by preparing individuals for in-demand, living-wage careers. They do this through training in careers that offer wages and growth opportunities that will not only support but advance a family. Project QUEST incorporates intensive support services to help participants overcome financial and personal barriers to skill acquisition in part through leveraging the training resources already operational in the community.

In 2018 Project QUEST served 1099 individuals and graduated 375. Participants in 2018 were 21% single parents, 62% Hispanic, 67% women and an average age of 30 years. Graduates in 2018 were placed into 27 in-demand occupations within the areas of healthcare, information technology and skilled trades. The current career paths include nursing and healthcare professions but do not include bioscience. Project QUEST has expressed an interested in expanding to meet the needs of the industry as well as to expand upon their demographics served. With this in mind, **it is recommended that industry leaders engage Project QUEST and other workforce support organizations in a guided discussion about potential collaborations and alignment.**

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\(^7\) [http://goodcareersacademy.com](http://goodcareersacademy.com)
\(^8\) [https://alamoacademies.com](https://alamoacademies.com)
\(^9\) [http://www.questsa.org](http://www.questsa.org)
APPENDIX & SOURCES

EMSI: LABOR MARKET STATISTICS (ECONOMICMODELING.COM)
Emsi is an online platform for labor market statistics, enabling analysis of region-specific job/occupation demand. Below are the search parameters used to query Emsi in December 2019 for occupations/job titles relevant to the bioscience industry in San Antonio.

Search Parameters:
- Occupations
- Occupation Overview
- Select Occupations: (occupations were queried one at a time from the below list)
  - “Medical Scientists, Except Epidemiologists (19-1042)” OR
  - “Biological Scientists, All Other (19-2019)” OR
  - “Veterinary Technologists and Technicians (29-2056)” OR
  - “Life, Physical, and Social Science Technicians, All Other (19-4099)” OR
- Select a Region: “San Antonio-New Braunfels, TX MSA (41700)”
- Timeframe: “2019-2024”
- Class of Worker (Basic): “Employees”

EDUCATION PROVIDER INFORMATION

UT HEALTH SAN ANTONIO
Institutional cores: https://www.uthscsa.edu/vpr/facilities/institutional-cores)

UNIVERSITY OF TEXAS SAN ANTONIO
Degrees Awarded Calculator: https://www.utsa.edu/ir/content/dashboards/degrees-awarded.html

OUR LADY OF THE LAKE UNIVERSITY
Fact Book: https://www.ollusa.edu/about/facts-and-figures/index.html

ST. MARY’S UNIVERSITY
Fact Book: https://www.stmarytx.edu/compliance/consumer-information/

TRINITY UNIVERSITY

UNIVERSITY OF THE INCARNATE WORD

TEXAS A&M UNIVERSITY
Fact Book: http://www.tamus.edu/oir/TAMUSAFactBook/FactBookhome.html

PALO ALTO COLLEGE
Fact Book: https://www.alamo.edu/pac/about-pac/compliance/knowledge-management/
NW VISTA COLLEGE
Fact Book: https://www.alamo.edu/nvc/about-us/leadership/institutional-research/

ST. PHILLIPS COLLEGE
Fact Book: https://www.alamo.edu/spc/about-spc/college-offices/planning-research-and-effectiveness/institutional-data/

SAN ANTONIO COLLEGE
Fact book: https://www.alamo.edu/contentassets/ff4c85722cb549b18c23dcf3ede9b158/alamo-colleges-benchmarks.pdf

NE LAKEVIEW COLLEGE
Fact Book: https://www.alamo.edu/contentassets/da5d8db936d44da18d8c7fd169f211a1/graduation-rates.pdf