Testimony of

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San Antonio, Texas

Before the hearing
Subcommittee on Information Technology
of the
U.S. House of Representatives
Committee on Oversight and Government Reform

Regarding
Closing the IT Gap in Federal IT

September 22, 2016

ALAMO COLLEGES

ALAMO ACADEMIES

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I. Introduction

Mr. Chairman and Members of the Committee, I am pleased to be here today speaking to you on behalf of Alamo Academies. Alamo Academies is an industry-driven, demand-based, workforce and economic development program. Over the past 15 years, this community collaborative program has served as the pathway for young men and women to achieve the American Dream.

II. Alamo Academies -- Advancing the School-to-Career Pathways

Alamo Academies, a non-profit organization, is a national award winning, innovative, Science, Technology, Engineering and Mathematics (STEM) based model partnering with industry, the Alamo Community College District, high schools and municipalities.

San Antonio addressed the "skills-gap" issue by founding Alamo Academies. Our model provides the region high-tech, high-skilled talent by developing a pipeline of college educated technicians to staff new jobs and replace a retiring workforce in targeted industry clusters: Aerospace, Advanced Manufacturing, IT & Security, Nursing and Heavy Equipment.

This model provides high school juniors and seniors with tuition-free career pathways into critical demand STEM occupations. Students attain industry and academic certificates leading to high-wage jobs or further higher education while addressing critical workforce needs. Over 1,200 graduates have received experiential training in industry-driven curricula resulting in 95% of the two-year graduates entering higher education or high-wage careers.

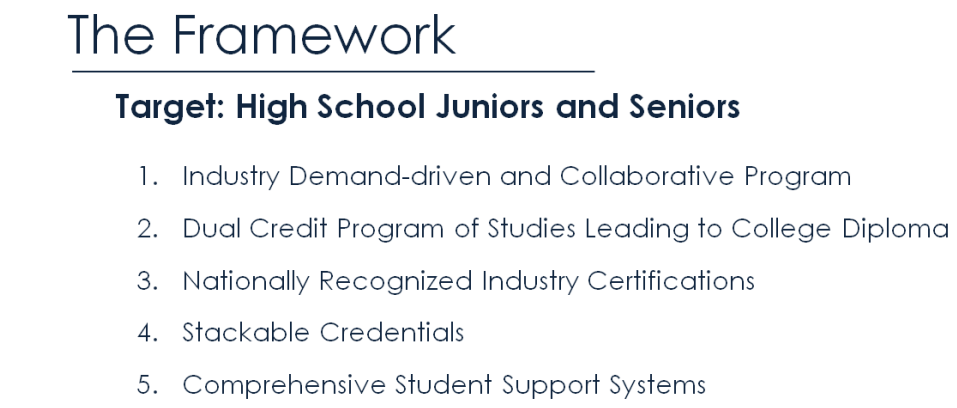

Figure 1

Since inception in 2001, we have been recognized as a "Best Practice" model by the Manufacturing Skill Standards Council (MSSC) and Texas Higher Education Coordinating Board (THECB). Alamo Academies received the prestigious Bellwether Award recognizing outstanding and innovative programs that successfully lead community colleges into the future.

National Journal cited Alamo Academies as one of the nation's top workforce innovations. Joe Wilson, Lockheed Martin (retired), stated ***"****We were trying to develop a strategy to replace a retiring workforce and wanted to make sure we transferred the knowledge and experience employees had before they retired. We partnered with the Alamo Colleges to develop a pipeline of young workers prepared to take jobs in our industry. The rest is history."*

Conceptual Model

Alamo Academies is an educational model driven by industry's projected/quantifiable workforce requirements. It is a collaborative process identifying curriculum pathways, recruitment, matriculation, support systems and target enrollment. Students are bussed to an Alamo Colleges campus daily where they engage in 2 ½ hours of experiential learning. During the two-year program of studies, students earn more than 30 college credits with courses articulating to an Associate of Applied Science (AAS) degree at no personal cost. Upon graduation, students can either attain a high-wage/high-skill career in a demand occupation or continue with their higher education pathway. The Academies model is replicable as evidenced by the additional pathways created. While the first program in 2001 focused on Aerospace, the model has produced four additional pathways: IT & Security (2002); Advanced Manufacturing (2004); Health Professions (2009); and Heavy Equipment (2014).

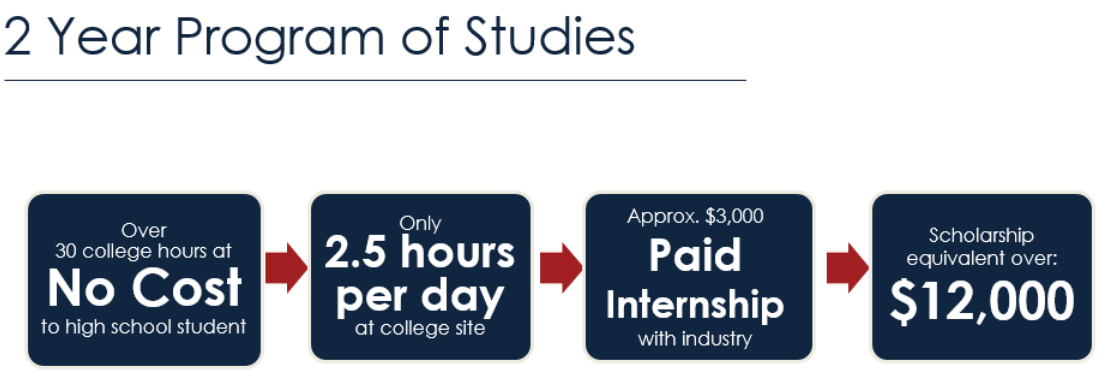

Figure 2

Paid Internships

As a key component of the program of studies, students participate in a mandatory paid internship – the ultimate real world experience. During the summer between their junior and senior year, students earn approximately $3,000 and college credit from their internship. Klaus Weiswurm, CEO of ITM, states *"we have seen that the paid internship component is such a transformative element in the maturation of the student. It is also beneficial to the industry partner as they have the opportunity to closely observe the work ethic and skills of the potential employee prior to actually hiring them."*

Community Partnerships

Each partner provides a unique contribution. Alamo Colleges provide facilities, equipment and instruction; each Independent School District (ISD) provides textbooks and round trip transportation; employers pay their intern's salaries; and municipalities fund operating costs.

Testament to community support is San Antonio's city ordinance stating *"The Academies represent a cost-effective economic development investment for the City and also reinforces the stated goals of the City's Strategic Plan for Enhanced Economic Development."*

Graduates Data
(2001 - 2016)

1,269 Graduates	
Continue to Higher Education / Industry	95%
Industry Certificates Awarded	2,370
Economically Disadvantaged	86%
Annual Student Enrollment	400

Diversity	
Hispanic	70%
Caucasian	22%
African-American	6%
Asian	2%

Gender	
Male	78%
Female	22%

Figure 3

III: IT & Security Program Curricula & Associate of Applied Science (AAS) Degree Pathway

Industry partners' involvement ensures that curriculum aligns with changing industry needs while keeping our students a valuable asset to the workforce. The Alamo Academies curricula allow students to earn stackable credentials encouraging them to continue their professional growth and promote lifelong learning.

For example, the first page of the IT & Security curriculum describes the Academies dual credit program of studies to include industry and college workforce certificates while the second page describes the courses articulating to the AAS degree (shown in red).

ALAMO COLLEGES

ALAMO ACADEMIES

Information Technology and Security Academy

1st Year Program of Studies
5 courses with total of 18 credit hours

Fall Semester		Credit
ITSC 1305	Intro to PC Operating Systems *Introduction to personal computer operating systems including installation, configuration, file management, memory & storage management, control of peripheral devices & use of utilities.*	3
ITSC 1425 *Testout Certification PC Pro	Personal Computer Hardware* *Current personal computer hardware including assembly, upgrading, setup, configuration, and troubleshooting.*	4
	Fall Semester Total	**7**

Spring Semester		Credit
ITNW 1425 *Testout Certification Network Pro	Fundamentals of Networking Technologies* *Introduction to architecture, structure, functions, Components & models of the internet. Covers Principles and structures of IP addressing, Ethernet, Media & operations.*	4
ITSC 2439	Personal Computer Desk Help Support *Diagnosis and solution of user hardware and Software related problems with on-the-job and/or Simulated projects.*	4
	Spring Semester Total	**8**

Summer Semester		Credit
ITSC 2364	Practicum: Computer & Information Sciences, General *Practical, general workplace training supported by an individualized learning plan.*	3
	Summer Total	**3**
	Year 1 Program Total	**18**

Level I Certificate of Completion
Computer Desktop Support Technician

2nd Year Program of Studies
4 courses with total of 12 credit hours

Fall Semester		Credit
ITSC 1316 *Testout Certification LINUX Pro	LINUX Installation & Configuration* *Introduction to the UNIX operation system including multi-user concepts, terminal emulation, use of system editor, basic UNIX commands, & writing script files. includes introductory system management concepts.*	3
ITSY 1342 *Testout Certification Security Pro	Information Technology Security* *Instruction in security for network hardware, software, and data including physical security, backup procedures, relevant tools, encryption, and protection from viruses.*	3
	Fall Semester Total	**6**

Spring Semester		Credit
ITSE 1302	Computer Programming *Introduction to computer programming with emphasis on the fundamentals of design, development, testing, implementation, and documentation. Includes language syntax, data and file structures, input/output devices, and files.*	3
ITSE 1311	Beginning Web Programming *Skill development in web page programming including mark-up and scripting languages.*	3
	Spring Semester Total	**6**
	Year 2 Program Total	**12**

Level I Certificate of Completion
Information Technology & Security

Two Year Program of Studies: 9 Courses totaling 30 credit hours

Information Technology and Security Academy

Level I Certificate of Completion
Computer Desktop Support Technician

Level I Certificate of Completion
Information Technology & Security

ASSOCIATE OF APPLIED SCIENCES

Computer Support Specialist

Semester 1		Credit
ITSC 1301	Introduction to Computers	3
ITSC 1309	Integrated Software Applications	3
ITSC 1305	Introduction to PC Operating Systems	3
ENGL 1301	Composition I	3
SPCH 1321	Introduction to Speech Communication *or other**	3
	1st Semester Total	15

Semester 2		Credit
ITNW 1425	Fundamentals of Networking Technologies	3
ITSC 1425	Personal Computer Hardware	3
ITNW 1454	Implementing and Supporting Servers	3
ITSC 1316	LINUX Installation and Configuration	3
	2nd Semester Total	15

Semester 3		Credit
HUMA 1301	Introduction to Humanities *or other**	3
ITSE 1302	Computer Programming	3
	3rd Semester Total	6

Semester 4		Credit
ITSC 2439	Personal Computer Help Desk Support	4
ITSE 1311	Beginning Web Programming	3
ITSC 2325	Advanced LINUX	3
ITSC 2321	Integrated Software Applications II	3
	4th Semester Total	13

Semester 5		Credit
ITSY 1342	Information Technology Security	3
MATH 1314	College Algebra *or other**	3
SOCI 1301	Introductory Sociology *or other**	3
ITSC 2264	Practicum Computer & Information Science	2
	4th Semester Total	11
	Program Total	60

DC/ITSA: 30 Total AAS Hours: 60

Hours needed Post DC/ITSA: 31 General Academics: 15
Specific Hours: 45

* See San Antonio College degree description for more information: http://mysaccatalog.alamo.edu/

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IV. Air Force Association's CyberPatriot: The National Youth Cyber Education Program

In addition to the paid internship, Alamo Academies' students benefit from an additional opportunity to apply the knowledge and skills learned in the classroom by participating in the Air Force Association's CyberPatriot Competition. Beginning in 2007, the Air Force Association and the University of Texas at San Antonio, Center for Infrastructure Assurance and Security worked together to develop and test a rigorous and demanding high school cyber defense competition known as CyberPatriot. The objective was to inspire high school students toward careers in cyber security or other STEM disciplines, critical to the nation. Today, CyberPatriot is the premier national youth cyber defense competition, in the U.S. and overseas. It includes three preliminary rounds of virtual competition, each six hours in length, executed from a team's home campus. The national championship is a grueling event which lasts for three days, requires each team to compete while defending their own network against some of the best Red Teams in the nation.

The first year of competition was restricted to a very small number of Junior ROTC teams. By 2010 the competition was up and fully running to include non-Junior ROTC teams (Open Division) for the first time. San Antonio business, academic, and government entities helped identify and align subject matter experts as mentors, conducted several clinics to help prepare students and coaches, and organized a recognition luncheon -- the San Antonio Mayor's Cyber Cup.

The Alamo Academies' 2011 Information Technology & Security Academy (ITSA) team won the inaugural Mayor's Cyber Cup and finished 3rd in the nation, out of approximately 650 teams. In 2012, the ITSA team returned and won the 2012 CyberPatriot National Championship (Open Division) in Washington, DC. As a magnet school team, the ITSA team had representatives from five different San Antonio area schools - they came together to win the national championship, beating more than 850 teams for the honor. These young men are now graduating from local colleges and universities and joining the cyber workforce here in San Antonio.

2012 CyberPatriot National Champions and San Antonio Mayor's Cyber Cup Winners

Pictured left to right: Robert Flores, Theodore Belitsos, Kenny Bias, Brian Carvan, Tommy Roberts, Mario Puente, and Coach Mike Matuszek, San Antonio College ITSA professor

In 2016, there were 189 San Antonio area teams competing in the CyberPatriot competition, against more than 3,300 teams from across the nation. The 2016 ITSA team again won the Mayor's Cyber Cup and advanced to compete against the top 12 teams at the CyberPatriot national finals. The ITSA program has won the San Antonio Mayor's Cyber Cup and advanced to the national championship five out of the last six years.

2016 CyberPatriot National Finalists and San Antonio Mayor's Cyber Cup Winners

Pictured left to right: Major General Ed Wilson, Eli Ross, Hector Iruegas, Kyle Volz, Reed Eggleston, Brendan Downs, Carlson Lindley, San Antonio Mayor Ivy Taylor

V. Closing the IT Gap in Federal IT

Pathways Unbound

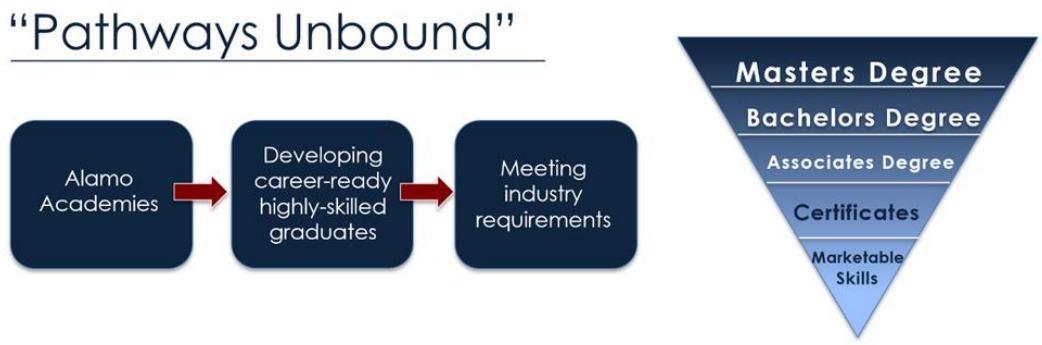

Figure 4

Graduate Testimonials

Career Pathway

Mario Puente – 2012 Graduate

College Pathway

Robert Flores – 2012 Graduate

Hybrid Pathway

Skylar Daugherty – 2015 Graduate

Kyle Volz – 2016 Graduate

Reed Eggleston – 2016 Graduate

Career Pathway

Mario Puente – 2012 Graduate

I am Mario Puente and I attended Brennan High School and Alamo Academies' Information Technology & Security Academy (ITSA) from 2010-2012. I joined ITSA to get a jump start not only in college credits but to start a career path to lead me to a steady and secure job in the future. My experience at ITSA was truly amazing, a dream come true. I never imagined I'd do or learn the things I did while attending the Alamo Academies. My involvement was life-changing; I wish for more young people to have the opportunity to experience the field of IT as I did.

I earned college credits in high school toward my Associates Degree which helped boost me ahead of my peers. I also learned the basics of computers and received real world training from college professors and industry professionals. Four years later, I am now a Lead in my position. I know that wouldn't be where I am today if I didn't learn the things I did from ITSA! I am the go to guy at my job because of how much I know.

One of two key elements in the ITSA program was my involvement with the Air Force Association's CyberPatriot program. CyberPatriot is the best thing that ever happened to me. The competition gave me true real world experience in the field of cybersecurity. It opened my eyes to what is possible in this career pathway. The competition was challenging like nothing I'd experienced before. I realized that our team possessed the skill and aptitude to be successful in the competition as long as we put 100% to it. In 2012, our team advanced to the national championship in Washington, DC to earn 1st place.

The second key element of the program is the paid internship I received during the summer following my first year at Alamo Academies. I was provided with an internship at the 33rd Network Warfare Squadron (NWS). This experience jump started my career path. The skill sets and mentorship I received proved invaluable to my future. As an ITSA intern, I was fortunate to earn a Secret Clearance. This distinction made me further realize the important sensitivity of my position. I began to feel more confident through my internship and realized that I could have a successful future in IT. My confidence continued to grow as many companies were looking to hire me after learning of my role within the 33rd NWS.

After graduating from high school and Alamo Academies, I decided to jump right into the working industry right away because on the job training is what industry is looking for! My experience working alongside the 33rd NWS continued to move me forward. Though I did go to college part time (online), I chose to take a small hiatus due to being offered a position at the Pentagon! In my role at the Pentagon, I served as a Computer Network Defense Analyst with interim TS/SCI, (Top Secret Clearance/ Sensitive Compartmented Information). This was another life-changing experience. Through working alongside seasoned professionals in this arena, I more clearly understood the need for my current skillset as well as the future need for advanced learning. I knew this was just beginning of my career.

As of today, I have returned to Texas as a full time DoD Contractor. I am a Lead Cyber Security analyst with 22nd Century Technologies supporting the United States Air Force's Weapon and Tactics Team known as the Air Force Computer Emergency Response Team. I have earned the following certifications: Microsoft Certified Professional, Certified Ethical Hacker, and Security+. My current role has recently expanded to include recruiting skilled members to our workforce of which I am glad to return to Alamo Academies to locate skilled graduates in the San Antonio area.

With the wealth of experience gained in the past four years, I am now completing my education in Information Assurance and Cyber Security as well as a Minor in Digital Forensics. I am confident returning to finish my degree because I understand continued education is a critical component for higher paying jobs when looking to advance in the Cyber Security field.

Alamo Academies helped me obtain incredible opportunities and experience toward the employment I am proud to have today. Without participating in this program, I would not be as successful as I am today. At 22 years of age, I am a Cyber Security professional earning an amazing salary with multiple certifications, nearly six years of on-the-job experience in supporting DoD initiatives, and no college debt. I appreciate this experience and look forward to opportunities to share the message. Recently, I had the privilege to refer 2016 graduates of ITSA to my current employer. It is an honor to be able to give back. Speaking from personal experience, this model is the vehicle for young men and women to gain on-the-job experience and become qualified with the skills necessary for critical jobs needing to be filled in Federal IT.

College Pathway

Robert Flores – 2012 Graduate

I am Robert Flores Jr., and I attended Judson High School and ITSA. I joined ITSA because I found the information security industry exciting as it is ever-growing, ever-changing and provides a huge technological challenge in adapting to new technologies and cyber-attacks. Data security remains a crucial element to business managers worldwide who must connect their intra-networks to the Internet in order to compete in the global market. I was confident that someday I would play a significant part in maintaining the Internet's revolutionary role by making individuals who use it feel secure. My experience at ITSA was incredible and I owe a huge portion of my success to ITSA since it was an invaluable launching pad to my vision which I am currently enjoying at Rackspace.

Participating in ITSA was an enormous benefit. I earned an Information Technology and Security Certification and 20 months as an intern with the Air Force that put my knowledge to use in a professional workforce environment. But most important is the incredible network of professionals, instructors, and fellow students I developed since my first day at ITSA. They supported me every step of the way! CyberPatriot made me a Rock Star as a met numerous government and state officials. The highlight being when, as Team Captain of the ITSA CyberPatriot Team, I led my team at national level competition in Washington D.C. and we were the CyberPatriot Open Division National Champions for 2012.

My decision to pursue my education first was simple because there is no substitute for knowledge/ education and it is seen as a strong foundation and a key ingredient for being successful. In May 2016, I earned a Bachelor of Business Administration in Cyber Security with a Minor in Digital Forensics from UTSA (University of Texas at San Antonio). I was fortunate to not incur any college debt since I used the Hazelwood program because of my father's military service as a Texas native. Plus, I earned and hold three certificates: CompTIA A+, CompTIA Security+, and CompTIA Network+.

I am a Rackspace employee since graduating from UTSA. In fact, I got a Rackspace employment offer a year prior to graduating. I am a Security Analyst as a member of the Information Security Operations Center (ISOC) Team at Rackspace in San Antonio, Texas. My employer is providing me a great salary, great benefits and tuition assistance.

The ITSA experiences definitely help in obtaining employment because it was my foundation that included my first internship with the Air Force. I had a total of three paid internships prior to graduating from UTSA and joining Rackspace.

Hybrid Pathway

Skylar Daugherty – 2015 Graduate

As a Junior in high school, my future path was unclear. I was facing the beginning of my independence and I had no idea where to start. Being such a pivotal time, I had to act quickly. I made the last minute decision to enroll in the Information Technology and Security Academy (ITSA) offered by Alamo Academies. I can say without a doubt that this was the best decision that I have made in my life so far. Little did I know, the decision would solidify the foundation from which I would continue into the career that I currently enjoy.

I cannot state enough how the majority of my success at this stage in my life is due to my involvement with ITSA. A key contribution to my success came from the CyberPatriot program. As much fun as it was to learn about information technology in the classroom, it was more fun to apply that knowledge in a real competitive environment. This allowed me to not only reinforce the knowledge that I had gained from my professors, but it also pushed me to learn on my own and gave me a constant thirst to want to learn more.

Through the help of Alamo Academies, I was able to earn my Associates degree in Information Assurance and Cyber Security from San Antonio College only a year after I graduated from high school without acquiring any college debt. I plan on continuing my education in order to earn my Bachelor's degree in the same field.

Most importantly, the internship program offered by ITSA allowed me to earn a position at Delta Risk LLC; a cyber security consulting agency located in downtown San Antonio. Originally hired as an intern focused on web development, I was later hired as a full time employee with a focus shifted toward cyber security, an area in which I have great confidence due to the teaching I received.

ITSA introduced me to a world of opportunity that I would have never had the access to otherwise and, because of these opportunities, not only am I the first in my family to graduate college, but, at just 19 years old, I have been able to earn a position within the career field that I want a future in. I feel incredibly confident that the help and teaching that I received from the Information Technology and Security Academy has given me a future that I could have only dreamt of having.

Hybrid Pathway

Kyle Volz – 2016 Graduate

My name is Kyle Volz, I attended Alamo Heights High School, and Alamo Academies' Information Technology & Security Academy (ITSA) from 2014-2016. I joined Alamo Academies because I have always had an interest in technology and thought that it would be a good opportunity for me to further my knowledge in the field of IT.

I quickly learned that joining ITSA was the right decision for me. The teachers were very helpful and knowledgeable and assisted us through the difficult coursework. I learned various subjects in the field from Hardware to Security Protocols to Programming. Without a doubt, this knowledge inspired me to learn more and ultimately qualified me to get the job that I now have.

I also participated in the CyberPatriot competition both years while at ITSA. In my senior year, our team won the San Antonio Mayor's Cyber Cup and advanced to the National Finals in Baltimore, MD. This experience helped me to apply the knowledge in a structured and competitive environment. The winning recognition also helped immensely by providing proof to show potential employers the skills that I have acquired through my time at Alamo Academies.

Currently, I hold the following certifications: CompTia Security+ and Certified Ethical Hacker (CEH) and am earning credits toward two Associate degrees at San Antonio College. I am proud to say that I have been referred and earned employment with DoD contractor, 22nd Century Technologies. At eighteen years old, I am being awarded a security clearance, earning a salary commensurable with other IT security professionals with full benefits and a 401k plan allowing me to gain my independence so much earlier than I had ever imagined.

What I have learned at Alamo Academies from the teachers and the CyberPatriot mentors is the reasons behind why I am able to get this job. Through ITSA, I was able to network with potential employers and understand the skills required for the workforce. I gained confidence and continued to apply knowledge that makes me a valuable asset to their team. I would not be where I am today without this direction. I look forward to giving back to the program as I continue to progress in my skill sets in my new role. I

highly recommend young men and women interested in the IT field get a head start on their education and experience in the field through Alamo Academies, ITSA.

Hybrid Pathway

Reed Eggleston – 2016 Graduate

My name is Reed Eggleston and I attended John Marshall High School and Alamo Academies' Information Technology & Security Academy (ITSA) from 2014-2016. I was attracted to the program because I wanted to do something different that would challenge me. I enjoyed computers and thought that I was fairly knowledgeable before joining ITSA. Within the first semester, I realized that I had much to learn. ITSA provided a wealth of knowledge at my disposal through college professors and industry professionals who specialize in the field.

I can truly say my experience at ITSA was spectacular. It gave me direction in life and the critical technical knowledge that allowed me to pursue high paying and in-demand jobs right out of high school. A few standout benefits include industry certifications, connections with industry professionals, and an understanding of unfilled IT jobs in the community. After my first year in the program, I had an internship with cyber security firm, Delta-Risk. The internship provided me with experience and connections that I still keep in contact with today. The leadership was impressed with my performance sharing, "If you ever need a job, come back and we'll hire you." To hear this comment was confirmation that I was moving in the right direction.

I share with new members of the ITSA branch of the Alamo Academies, "You don't really feel the true power of the Academy unless you join CyberPatriot," and I still believe this. The CyberPatriot competition brought out the best in myself as a student and as a leader; allowing a framework to which I could practice cybersecurity in my daily life. I had to hone my ability to self-learn and apply security concepts inside and outside of the classroom. It also promoted my competitive drive to increase my skill sets among some of the best young professionals in the nation.

Serving as the captain of the ITSA 2016 CyberPatriot team was a remarkable experience in both cyber security and also in leadership. Together our team studied at least 3 hours a day, nearly every single day, for over a year so that we could make it to national finals in the competition and I don't regret it in the slightest. Advancing as one of the top 12 teams in nation to the Open Division National Championship gave us the confidence to push ourselves to new heights. That experience continues to prove valuable in my life, today.

Today I hold both CompTia Security + Certification as well as Certified Ethical Hacker (CEH) from EC-Council. Thanks to an ITSA alumnus, I was referred and hired as a Tier II Analyst for DoD defense contractor, 22nd Century Technologies Inc. in San Antonio, TX.

Alamo Academies' ITSA program taught me how to do many things, from being professional in an office environment to hands on skills that I need in the workforce. Another highlight is the networking that stemmed from ITSA and CyberPatriot; I was able to build relationships with professionals in the field who are eager to share their experiences to help me along my journey. I enjoy giving back to ITSA and frequently mentor current students. I am grateful to the program for allowing me to build the foundation from which I am still expanding upon.

ADDENDUMS

Program Curricula & Associate of Applied Science (AAS) Degree Pathways

A. Information Technology & Security Academy (ITSA) Curricula & Associate of Applied Science (AAS) Degree Pathway: Computer Support Specialist

B. Aerospace Academy (AA) Curricula & Associate of Applied Science (AAS) Degree Pathways: Aircraft Technician Airframe or Aircraft Technician Powerplant

C. Advanced Technology and Manufacturing Academy (ATMA) Curricula & Associate of Applied Science (AAS) Degree Pathways: CNC Manufacturing Technician or Manufacturing Operations Technician

D. Health Professions Academy (HPA) Curricula & Associate of Applied Science (AAS) Degree Pathway: Nursing

E. Heavy Equipment Academy (HEA) Curricula & Associate of Applied Science (AAS) Degree Pathway: Diesel/Construction Equipment Technology

ALAMO COLLEGES

Addendum A

ALAMO ACADEMIES

Information Technology and Security Academy

1st Year Program of Studies
5 courses with total of 18 credit hours

Fall Semester		Credit
ITSC 1305	Intro to PC Operating Systems *Introduction to personal computer operating systems including installation, configuration, file management, memory & storage management, control of peripheral devices & use of utilities.*	3
ITSC 1425 *Testout Certification PC Pro	Personal Computer Hardware* *Current personal computer hardware including assembly, upgrading, setup, configuration, and troubleshooting.*	4
	Fall Semester Total	**7**

Spring Semester		Credit
ITNW 1425 *Testout Certification Network Pro	Fundamentals of Networking Technologies* *Introduction to architecture, structure, functions, Components & models of the internet. Covers Principles and structures of IP addressing, Ethernet, Media & operations.*	4
ITSC 2439	Personal Computer Desk Help Support *Diagnosis and solution of user hardware and Software related problems with on-the-job and/or Simulated projects.*	4
	Spring Semester Total	**8**

Summer Semester		Credit
ITSC 2364	Practicum: Computer & Information Sciences, General *Practical, general workplace training supported by an individualized learning plan.*	3
	Summer Total	**3**
	Year 1 Program Total	**18**

Level I Certificate of Completion
Computer Desktop Support Technician

2nd Year Program of Studies
4 courses with total of 12 credit hours

Fall Semester		Credit
ITSC 1316 *Testout Certification LINUX Pro	LINUX Installation & Configuration* *Introduction to the UNIX operation system including multi-user concepts, terminal emulation, use of system editor, basic UNIX commands, & writing script files. includes introductory system management concepts.*	3
ITSY 1342 *Testout Certification Security Pro	Information Technology Security* *Instruction in security for network hardware, software, and data including physical security, backup procedures, relevant tools, encryption, and protection from viruses.*	3
	Fall Semester Total	**6**

Spring Semester		Credit
ITSE 1302	Computer Programming *Introduction to computer programming with emphasis on the fundamentals of design, development, testing, implementation, and documentation. Includes language syntax, data and file structures, input/output devices, and files.*	3
ITSE 1311	Beginning Web Programming *Skill development in web page programming including mark-up and scripting languages.*	3
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	Year 2 Program Total	**12**

Level I Certificate of Completion
Information Technology & Security

Two Year Program of Studies: 9 Courses totaling 30 credit hours

Information Technology and Security Academy

Level I Certificate of Completion
Computer Desktop Support Technician

Level I Certificate of Completion
Information Technology & Security

ASSOCIATE OF APPLIED SCIENCES

Computer Support Specialist

Semester 1		Credit
ITSC 1301	Introduction to Computers	3
ITSC 1309	Integrated Software Applications	3
ITSC 1305	Introduction to PC Operating Systems	3
ENGL 1301	Composition I	3
SPCH 1321	Introduction to Speech Communication *or other**	3
	1st Semester Total	15

Semester 2		Credit
ITNW 1425	Fundamentals of Networking Technologies	3
ITSC 1425	Personal Computer Hardware	3
ITNW 1454	Implementing and Supporting Servers	3
ITSC 1316	LINUX Installation and Configuration	3
	2nd Semester Total	15

Semester 3		Credit
HUMA 1301	Introduction to Humanities *or other**	3
ITSE 1302	Computer Programming	3
	3rd Semester Total	6

Semester 4		Credit
ITSC 2439	Personal Computer Help Desk Support	4
ITSE 1311	Beginning Web Programming	3
ITSC 2325	Advanced LINUX	3
ITSC 2321	Integrated Software Applications II	3
	4th Semester Total	13

Semester 5		Credit
ITSY 1342	Information Technology Security	3
MATH 1314	College Algebra *or other**	3
SOCI 1301	Introductory Sociology *or other**	3
ITSC 2264	Practicum Computer & Information Science	2
	4th Semester Total	11
	Program Total	60

DC/ITSA: 30 Total AAS Hours: 60

Hours needed Post DC/ITSA: 31 General Academics: 15
Specific Hours: 45

* See San Antonio College degree description for more information: http://mysaccatalog.alamo.edu/

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ALAMO COLLEGES

Addendum B

Aerospace Academy

ALAMO ACADEMIES

1st Year Program of Studies
8 courses with total of 21 credit hours

Fall Semester		Credit
AERM 1201 *10-hr OSHA	Introduction to Aviation* *An overview of aviation maintenance.*	2
AERM 1315	Aviation Science *Fundamentals of mathematics, physics & drawing as they apply to aircraft principles & operations.*	3
AERM 1303	Shop Practice *Introduction to the correct use of hand tools and equipment & precision measurement; identification of aircraft hardware; & fabrication of fluid lines and tubing.*	3
	Fall Semester Total	**8**

Spring Semester		Credit
AERM 1208	Federal Aviation Regulations *A course in the use & understanding of the FAA & aircraft manufacturer's publications, forms & records.*	2
AERM 1205	Weight & Balance *An introduction to FAA required subjects relating to weighing of aircraft, performance of weight & balance calculations, & appropriate maintenance of record entries.*	2
AERM 1310	Ground Operations *An introduction course in fuels, servicing methods And procedures, aircraft movement, securing and Operations of aircraft, external power equipment, Aircraft cleaning, and corrosion control.*	3
POFT 1220	Job Search Skills *A course to provide students with necessary skills to seek & obtain employment in business & industry.*	2
	Spring Semester Total	**9**

Summer Semester		Credit
AERM 2486	Internship: Aircraft Mechanic *Practical, general workplace training supported by an individualized learning plan.*	4
	Summer Total	**4**
	Year 2 Program Total	**19**

Marketable Skills Award Certificate
Aircraft Technology MSAC
(5 courses, 13 hours)

2nd Year Program of Studies
4 courses with total of 11 or 12 credit hours

Fall Semester		Credit
AERM 1414	Basic Electricity *A study of aircraft electrical systems and their requirements.*	4
AERM 1254	Aircraft Composite *A study of the inspection & repair of composite, Fiberglass, honeycomb, and laminated structural materials.*	2
	Fall Semester Total	**6**

Spring Semester		Credit
	Aircraft Structures Mechanic	
AERM 1241	Wood, Fabric & Finishes *A course in the use & care of various covering materials, finishes, & wood structures including approved methods and procedures.*	2
AERM 1352	Aircraft Sheet Metal *A course in inspection & repair of sheet metal structures.*	3
	Spring Semester Total	**5**
	Or	
	Aircraft Turbines Mechanic	
AERM 1351	Aircraft Turbine Engine Theory *Theory, history & servicing of turbine engines.*	3
AERM 2351	Aircraft Turbine Engine Overhaul *Topics address inspection, disassembly, re-assembly & replacement of gas turbine engines, sections, & components as well as operational troubleshooting & analysis.*	3
	Spring Semester Total	**6**
	Year 2 Program Total	**15**

Level I Certificate of Completion

Aircraft Turbines Mechanic or **Aircraft Structures Mechanic**

Two Year Program of Studies: 12 Courses totaling 32 (Structures) or 33 (Turbines) credit hours

Aerospace Academy

Level I Certificate of Completion
Aircraft Structures Mechanic

ASSOCIATE OF APPLIED SCIENCES

Aircraft Technician Airframe

Semester 1		Credit
ENGL 1301	Composition I *or other**	3
MATH 1333	Contemporary Mathematics II *or other**	3
PHYS 1305	Introductory to Physics I Lecture *or other**	3
ECON 1301	Introduction to Economics *or other**	3
ARTS 2326	Sculpture I *or other**	3
	1st Semester Total	15

Semester 2		Credit
AERM 1205	Weights & Balance	2
AERM 1208	Federal Aviation Regulations	2
AERM 1310	Ground Operations	3
AERM 1303	Shop Practices	3
AERM 1315	Aviation Science	3
AERM 1414	Basic Electricity	4
AERM 1241	Wood, Fabric & Finishes	2
	2nd Semester Total	19

Semester 3		Credit
AERM 1243	Instruments & Navigation/Communication	2
AERM 2231	Airframe Inspection	2
AERM 1345	Aircraft Electrical Systems	3
	3rd Semester Total	7

Semester 4		Credit
AERM 1449	Hydraulic, Pneumatic, & Fuel Systems	4
AERM 1350	Landing Gear Systems	3
AERM 1254	Aircraft Composites	2
AERM 1253	Aircraft Welding	2
AERM 1352	Aircraft Sheet Metal	3
AERM 1347	Aircraft Auxiliary Systems	3
AERM 2233	Assembly & Rigging	2
	4th Semester Total	16
	Program Total	60

DC/AA: 24 Total AAS Hours: 60

Hours needed Post DC/AA: 36 General Academics: 15
Specific Hours: 21

Level I Certificate of Completion
Aircraft Turbines Mechanic

ASSOCIATE OF APPLIED SCIENCES

Aircraft Technician Powerplant

Semester 1		Credit
ENGL 1301	Composition I *or other**	3
MATH 1333	Contemporary Mathematics II *or other**	3
PHYS 1305	Introductory to Physics I *or other**	3
ECON 1301	Introduction to Economics *or other**	3
ARTS 2326	Sculpture I *or other**	3
	1st Semester Total	15

Semester 2		Credit
AERM 1205	Weights & Balance	2
AERM 1208	Federal Aviation Regulations	2
AERM 1310	Ground Operations	3
AERM 1303	Shop Practices	3
AERM 1315	Aviation Science	3
AERM 1414	Basic Electricity	4
AERM 1444	Aircraft Reciprocating Engines	4
	2nd Semester Total	21

Semester 3		Credit
AERM 2352	Aircraft Powerplant Inspection	3
	3rd Semester Total	3

Semester 4		Credit
AERM 2547	Aircraft Reciprocating Overhaul	5
AERM 1340	Aircraft Propellers	3
AERM 1351	Aircraft Turbine Engine Theory	3
AERM 2351	Aircraft Turbine Engine Overhaul	3
AERM 1456	Powerplant Electrical	4
AERM 1357	Fuel Metering & Induction Systems	3
	4th Semester Total	21
	Program Total	60

DC/AA: 23 Total AAS Hours: 60

Hours needed Post DC/AA: 37 General Academics: 15
Specific Hours: 22

* See St. Philip's College degree description for more information: http://myspccatalog.alamo.edu/

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ALAMO COLLEGES

Addendum C

ALAMO ACADEMIES

Advanced Technology and Manufacturing Academy

1st Year Program of Studies
6 courses with total of 19 credit hours

Fall Semester		Credit
TECM 1303	Technical Calculations *Specific mathematical calculations required by business and industry. Includes whole numbers, fractions, mixed numbers, decimals, %, ratios, and proportions. Also, covers converting to different units of measure (standard and/or metric).*	3
MCHN 1320 *10-Hour OSHA	Precision Tools & Measurements* *Introduction to modern science of dimensional metrology.*	3
MCHN 1270 * MSSC Safety Certification	MSSC* *Manufacturing Skill Standards Council Certified production Technician Safety & Quality Modules.*	2
	Fall Semester Total	**8**

Spring Semester		Credit
MCHN 1302	Print Reading for Machine Trade *A review of applied math models and study of different blueprints, with emphasis on machine blueprints and the application of each.*	3
MCHN 1438	Basic Machine Shop *An introduction course that assists the student in understanding the machinist occupation in industry.*	4
	Spring Semester Total	**7**

Summer Semester		Credit
MCHN 2486	Internship: Machine Tool Technology/Machinist *Practical, general workplace training supported by an individualized learning plan.*	4
	Summer Total	**4**
	Year 1 Program Total	**19**

Level I Certificate of Completion
Manufacturing Skills Trade Helper

2nd Year Program of Studies
5 courses with total of 15 credit hours

Fall Semester		Credit
INMT 2303	Pumps, Compressors & Mechanical Drives *A study of the theory and operations of various types of pumps and compressors.*	3
ELPT 1319	Fundamentals of Electrical I *Basic theory and practice of electrical circuits.*	3
QCTC 1243 * MSSC Quality Certification	Quality Assurance* *Principles & application designed to introduce quality assurance.*	2
	Fall Semester Total	**8**

Spring Semester		Credit
MCHN 1426	Introduction to Computer-Aided Manufacturing (CAM) *A study of Computer Assisted Manufacturing (CAM) systems. Software is used to develop applications for manufacturing.*	4
MCHN 1438	Basic Machine Shop *An introduction course that assists the student in understanding the machinist occupation in industry.*	3
	Spring Semester Total	**7**
	Year 2 Program Total	**15**

Level I Certificate of Completion
Tool Operator/Maintenance Assistant

Two Year Program of Studies: 11 Courses totaling 34 credit hours

Advanced Technology and Manufacturing Academy

Level I Certificate of Completion
Manufacturing Skills Trade Helper

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Level I Certificate of Completion
Tool Operator/Maintenance Assistant

ASSOCIATE OF APPLIED SCIENCES

Manufacturing Operations Technician

Semester 1		Credit
MCHN 1438	Basic Machine Shop I	4
MCHN 1320	Precision Tools & Measurement	3
MATH 1333	Contemporary Mathematics II *or other**	3
INMT 2303	Pumps, Compression & Mechanical Drives	3
ITSC 2303	Introduction to Computers I *or other**	3
	1st Semester Total	16

Semester 2		Credit
ENGL 1301	Composition I *or other**	3
ELPT 1319	Fundamentals of Electrical I	3
ELMT 1305	Basic Fluid Power	3
PHYS 1305	Introductory to Physics I Lecture *or other**	3
RBTC 1305	Robotic Fundamentals	3
	2nd Semester Total	15

Semester 3		Credit
RBTC 2347	Computer Integrated Manufacturing	3
WLDG 1425	Intro to Oxy-Fuel Welding & Cutting	4
RBTC 1347	Electromechanical Devices	3
ECON 1301	Introduction to Economics *or other**	3
	3rd Semester Total	13

Semester 4		Credit
MCHN 1302	Print Reading for Machining Trade	3
ELPT 2419	Programmable Logic Controllers I	4
ELPT 1441	Motor Control	4
MUSI 1306	Music Appreciation *or other**	3
MCHN 2266	Practicum (for field experience)	2
	4th Semester Total	16
	Program Total	60

DC/ATMA: 21 Total AAS Hours: 60

Hours needed Post DC/ATMA: 39 General Academics: 18
Specific Hours: 21

ASSOCIATE OF APPLIED SCIENCES

CNC Manufacturing Technician

Semester 1		Credit
MCHN 1302	Print Reading for Machining Trade	3
MCHN 1438	Basic Machine Shop I	4
MATH 1332	Contemporary Math I *or other**	3
MCHN 1320	Precision Tools & Measurement	3
ITSC 2303	Introduction to Computers I *or other**	3
	1st Semester Total	16

Semester 2		Credit
ENGL 1301	Composition I *or other**	3
MCHN 2403	Fundamentals of Computer Numerical Controlled (CNC) Machine Controls	3
QCTC 1243	Quality Assurance	2
PHYS 1305	Introductory to Physics I Lecture *or other**	3
MCHN 1426	Intro to Computer-Aided Manufacturing (CAM)	4
	2nd Semester Total	15

Semester 3		Credit
ECON 1301	Introduction to Economics *or other**	3
MCHN 2431	Operation of CNC Turning Centers	4
MCHN 2434	Operation of CNC Machining Centers	4
MCHN 1330	Statistical Process Control for Machinist	3
MUSI 1306	Music Appreciation or other*	3
	3rd Semester Total	17

Semester 4		Credit
MCHN 2435	Advanced CNC Machining	4
MCHN 1352	Intermediate Machining I	3
RBTC 1305	Robotic Fundamentals	3
MCHN 2266	Practicum (for field experience)	2
	4th Semester Total	12
	Program Total	60

DC/ATMA: 21 Total AAS Hours: 60

Hours needed Post DC/ATMA: 39 General Academics: 18
Specific Hours: 21

* See St. Philip's College degree description for more information: http://myspccatalog.alamo.edu/

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ALAMO COLLEGES

ALAMO ACADEMIES

Addendum D

Health Professions Academy

1st Year Program of Studies
4 courses with total of 14 credit hours

Fall Semester		Credit
BIOL 2401	Human Anatomy & Physiology *Studying structure & function of cells, tissues, & body systems with emphasis on integumentary, skeletal, muscular, nervous systems including the special senses.*	4
ENGL 1301	Composition I *Focusing on the principles of effective oral and written communication, critical reading & the development of academic writing.*	3
	Fall Semester Total	**7**

Spring Semester		Credit
BIOL 2402	Human Anatomy & Physiology II *Studying the structure & function of the endocrine, digestive, respiratory, cardiovascular, lymphatic, genitourinary & reproductive systems.*	4
ENGL 1302	Composition II *Refining skills in academic writing, critical thinking, analysis of literature and research & documentation.*	3
	Spring Semester Total	**7**
	Year 1 Program Total	**14**

2nd Year Program of Studies
5 courses with total of 17 credit hours

Fall Semester		Credit
BIOL 2420	Microbiology for Allied Health Majors *Introduction to historical concepts of the nature of microorganisms, microbial diversity, the importance of microorganisms and acellular agents in the biosphere, and their roles in human & animal diseases.*	4
PSYC 2301	General Psychology *Introduction of the study of behavior and the factors that determine & affect behavior and mental processes.*	3
	Fall Semester Total	**8**

Spring Semester		Credit
PHIL 2306	Introduction to Ethics *Classical & contemporary theories concerning the good life, human conduct in society, and moral & ethical standards.*	3
PSYC 2314	Lifespan Growth & Development *Study of the relationship of the physical, emotional, social and mental factors of growth & development of the individual throughout the lifespan.*	3
MDCA 1313	Medical Terminology *The study and practical application of a medical vocabulary system. It includes structure, recognition, Analysis, definition, spelling, pronunciation, and Combination of medical terms from prefixes, Suffixes, roots, and combining forms.*	3
	Spring Semester Total	**9**
	Year 2 Program Total	**16**

All classes transferrable into the Nursing Program at San Antonio College

Two Year Program of Studies: 9 Courses totaling 30 credit hours

Health Professions Academy

Prerequisites transferable to Allied Health Career Pathways

ASSOCIATE OF APPLIED SCIENCES

Nursing

Semester 1		Credit
BIOL 2401	Human Anatomy & Physiology I	4
ENGL 1301	Composition I	3
	1st Semester Total	7

Semester 2		Credit
BIOL 2402	Human Anatomy & Physiology II	4
PSYC 2301	Composition II	3
	2nd Semester Total	7

Semester 3		Credit
BIOL 2420	Microbiology & Pathology	4
PHIL 2306	Introduction to Ethics	3
	3rd Semester Total	7

Semester 4		Credit
PSYC 2314	Lifespan Growth & Development	3
	4th Semester Total	3
	Program Total	24

Semester 5		Credit
RNSG 1128	Intro Health Care Concepts I	1
RNSG 1125	Professional Nursing Concepts I	1
RNSG 1216	Professional Nursing Competencies I	2
RNSG 1430	Health Care Concepts I	4
RSNG 1161	Clinical-RN: Health Care Concepts I	1
	1st Semester Total	9

Semester 6		Credit
RNSG 1126	Professional Nursing Concepts II	1
RNSG 1533	Health Care Concepts II	5
RNSG 2362	Clinical-RN: Health Care Concepts II	3
	2nd Semester Total	9

Semester 7		Credit
RNSG 1137	Professional Nursing Concepts III	1
RNSG 1538	Health Care Concepts III	5
RNSG 2363	Clinical-RN: Health Care Concepts III	3
	3rd Semester Total	9

Semester 8		Credit
RNSG 2138	Professional Nursing Concepts IV	1
RNSG 2539	Health Care Concepts IV	5
RNSG 2360	Clinical-RN: Health Care Concepts IV	3
	4th Semester Total	9
	Program Total	36

DC/HPA: 30 Total AAS Hours: 60

Hours needed Post DC/HPA: 36 General Academics: 24

Specific Hours: 36

ALAMO COLLEGES

ALAMO ACADEMIES

Addendum E

Heavy Equipment Academy

1st Year Program of Studies
5 courses with total of 17 credit hours

Fall Semester		Credit
DEMR 1406 *HOLT CAT ProTech Engine D&A DE101	Diesel Engine I* *An introduction to the basic principles of diesel engines & systems.*	4
DEMR 1416 *HOLT CAT ProTech Hydraulics TM28	Basic Hydraulics* *Fundamentals of hydraulics including components and related systems.*	4
	Fall Semester Total	**8**

Spring Semester		Credit
DEMR 1405 *10-Hour OSHA *HOLT CAT ProTech Electricity TG01	Basic Electrical Systems* *A review of applied math models and study of different blueprints, with emphasis on machine blueprints and the application of each.*	4
DEMR 1329	Preventative Maintenance *An introduction course that assists the student in understanding the machinist occupation in industry.*	3
	Spring Semester Total	**7**

Summer Semester		Credit
DEMR 2366	Internship: Diesel Mechanics Technology/Technician *Practical, general workplace training supported by an individualized learning plan.*	3
	Summer Total	**3**
	Year 1 Program Total	**18**

Marketable Skills Award Certificate
Diesel/Light Heavy Truck Technology Mechanic

2nd Year Program of Studies
4 courses with total of 16 credit hours

Fall Semester		Credit
DEMR 1423 *HOLTCAT ProTech HVAC TG12 & ASE Refrigerant Recovery & Recycling	Heating, Ventilation, & Air Conditioning* *Introduction to heating, ventilation, & air Conditioning theory, testing, & repair. Emphasis On refrigerant reclamation, safety procedures, Specialized tools & repairs.*	4
DEMR 2439	Advanced Electrical Systems *A continuation of basic electrical systems to include Lighting, computer controls, and accessories.*	4
	Fall Semester Total	**8**

Spring Semester		Credit
DEMR 2434 *HOLTCAT ProTech Electronic Troubleshooting DE205	Advanced Diesel Tune-Up and Troubleshooting* *Advanced concepts & skills required for tune-up & troubleshooting procedures of diesel engines. Emphasis on the science of diagnostics with a Common sense approach.*	4
DEMR 2435	Advanced Hydraulics *Advanced study of hydraulic systems & components including diagnostics & testing of hydraulic systems.*	4
	Spring Semester Total	**8**
	Year 2 Program Total	**16**

Level I Certificate of Completion
Diesel Heavy Equipment

Two Year Program of Studies: 11 Courses totaling 34 credit hours

Heavy Equipment Academy

Level I Certificate of Completion
Diesel Heavy Equipment

ASSOCIATE OF APPLIED SCIENCES

Diesel/Light Heavy Truck Technology

Semester 1		Credit
DEMR 1406	Diesel Engine	4
DEMR 1405	Basic Electrical Systems	4
DEMR 1330	Steering & Suspension	3
DEMR 1416	Basic Hydraulics	4
	1st Semester Total	15

Semester 2		Credit
DEMR 1417	Basic Brake System	4
DEMR 1421	Power Train	4
DEMR 1423	Heating, Ventilation, & Air Conditioning	4
PHYS 1305	Intro to Physics Lecture	3
	2nd Semester Total	15

Semester 3		Credit
GOVT 2301	American/Texas	3
ENGL 1301	Freshman Composition	4
	3rd Semester Total	6

Semester 4		Credit
DEMR 1329	Preventative Maintenance	3
DEMR 2434	Advanced Diesel Tune-Up & Troubleshooting	4
MATH 1333	Contemporary Mathematics II *or other*	3
	4th Semester Total	13

Semester 5		Credit
DEMR 2439	Advanced Electrical Systems	4
DEMR 2266	Practicum: Diesel Mechanics	3
	Welding Elective	4
	5th Semester Total	10

Program Total	60

DC/HEA: 30 Total AAS Hours: 60

Hours needed Post DC/HEA: 30 General Academics: 15

Specific Hours: 15

* See St. Philip's College degree description for more information: http://myspccatalog.alamo.edu/