ORLANDO
ECONOMIC
PARTNERSHIP

Semiconductor Manufacturing
in Orlando:

Part III – A Review of the Education Ecosystem

FOUNDATION FOR
ORLANDO'S
FUTURE

Contents

Executive Summary

There has been a recent surge in investment in the semiconductor manufacturing industry in America. With the passage of the CHIPS and Science Act in 2022, the demand for semiconductor manufacturing talent has grown rapidly. Regions around the country are working to find solutions to what has become a global talent shortage.

In the Orlando region (a four-county area encompassing Orange, Osceola, Seminole, and Lake County), a wide range of education and industry leaders are building new programs that put Orlando at the forefront of national efforts to solve this talent shortage.

Interviews with local education leaders and tours of new facilities reveal that Orlando is creating a comprehensive education ecosystem for training semiconductor manufacturing talent.

Previously, Orlando offered STEM magnet programs to K-12 students on one end of the education journey and a master's degree in Nanotechnology at the University of Central Florida (UCF) on the other. While other, existing certificate, associate, and bachelor programs offered transferable skills in the region, only recently have programs that are extremely specific to semiconductor manufacturing come online or been announced.

Today, many possible on-ramps to employment in the semiconductor manufacturing industry exist through Orlando's educational institutions:

- Students at NeoCity Academy (a local **STEM high school**) are exposed to the industry through internships with industry located directly across the street.

- For older students or working adults looking to reskill, an innovative, **22-week technician course** at Valencia Community College offers the opportunity to gain hands-on experience with the complicated robots used to build semiconductors.

- In the future, regional employers will be able to take advantage of an **associate degree program** in semiconductor engineering technology at Valencia College by helping existing employees continue their education.

- A partnership between Valencia College and UCF means that completers of the two-year program will be able to easily matriculate into a planned **four-year semiconductor bachelor's degree program**.

Orlando is creating a comprehensive ecosystem for semiconductor manufacturing workforce development.
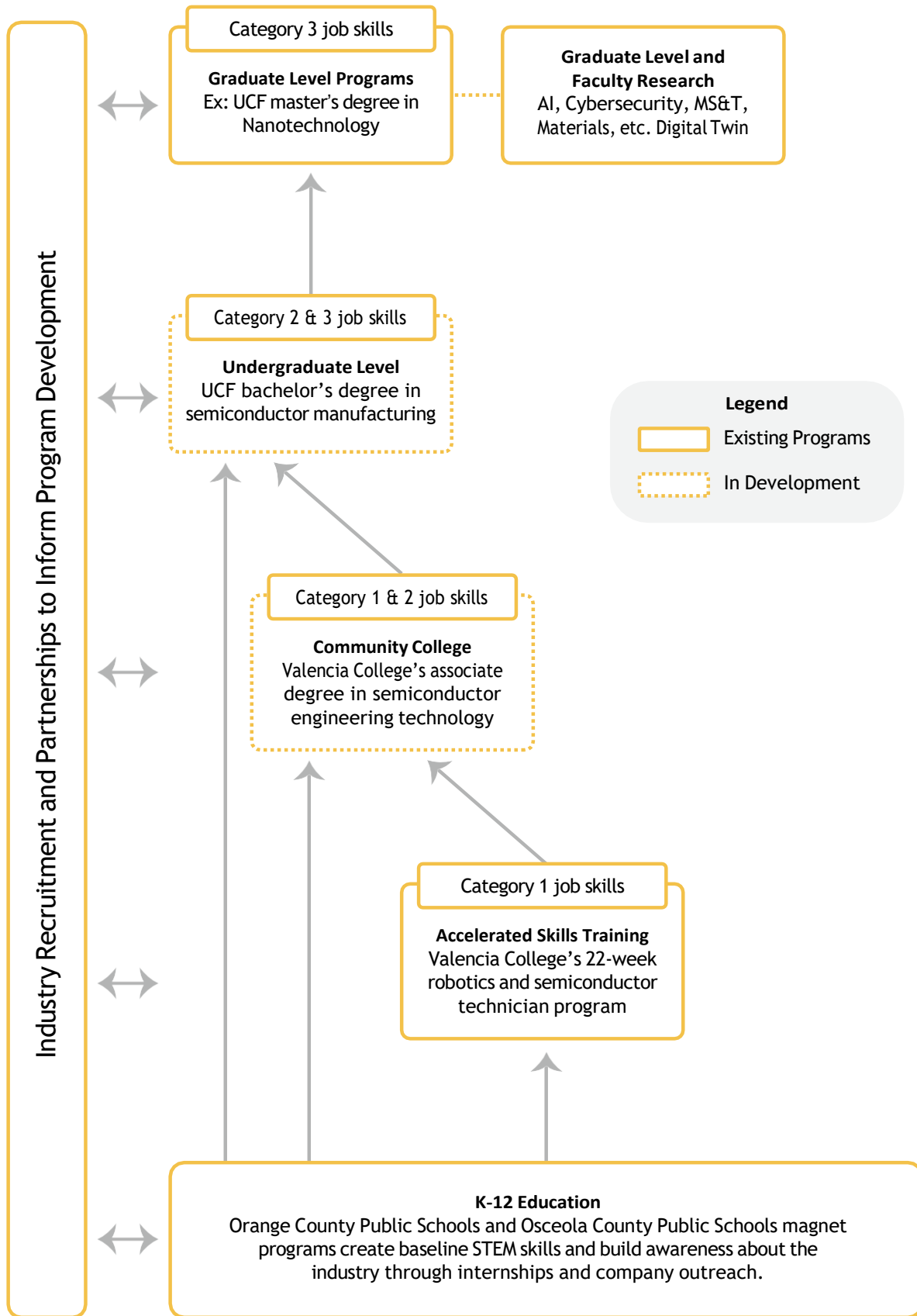
- Finally, research on a **digital twin** of the semiconductor manufacturing line at NeoCity will expose advanced engineers from other disciplines to the needs of semiconductor manufacturing and attract subject matter experts to the industry.

FIGURE 1 below maps Orlando's education ecosystem. Arrows represent the flow of talent through regional institutions. Starting with foundational K-12 programs and working up toward university-level research assets, each program is designed to advance Orlando's semiconductor manufacturing industry and sustain a pipeline of workers at all levels.

Lastly, and most importantly, success stories about two employees in Orlando's semiconductor manufacturing industry highlight the non-traditional routes available to residents no matter what their previous educational background may be. Cory and Anita are both employees at local semiconductor manufacturer, SkyWater. Their stories highlight how leaders in higher education, workforce development, and local companies work together in Orlando to prepare residents for emerging, quality jobs in new industries.

FIGURE 1: EDUCATION ECOSYSTEM MAP FOR THE SEMICONDUCTOR MANUFACTURING INDUSTRY IN ORLANDO

Industry Recruitment and Partnerships to Inform Program Development

Category 3 job skills

Graduate Level Programs
Ex: UCF master's degree in Nanotechnology

Graduate Level and Faculty Research
AI, Cybersecurity, MS&T, Materials, etc. Digital Twin

Category 2 & 3 job skills

Undergraduate Level
UCF bachelor's degree in semiconductor manufacturing

Legend
Existing Programs
In Development

Category 1 & 2 job skills

Community College
Valencia College's associate degree in semiconductor engineering technology

Category 1 job skills

Accelerated Skills Training
Valencia College's 22-week robotics and semiconductor technician program

K-12 Education
Orange County Public Schools and Osceola County Public Schools magnet programs create baseline STEM skills and build awareness about the industry through internships and company outreach.
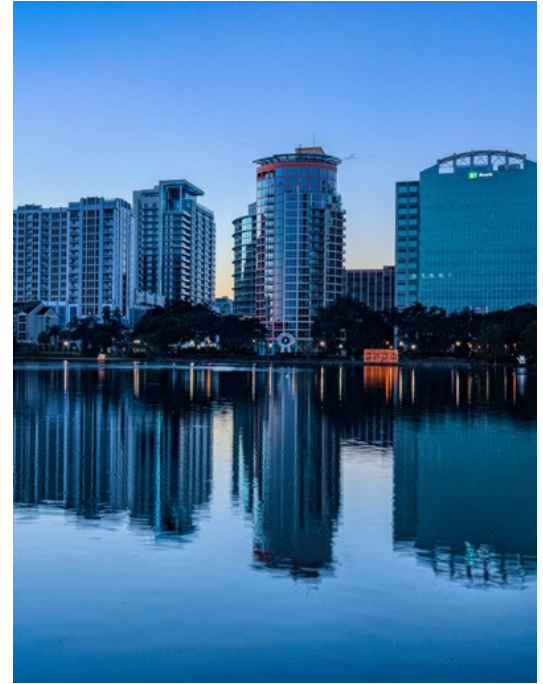
Introduction

This is the third installment of a report series focused on the semiconductor manufacturing workforce in the Orlando region. Specifically focused on talent development and education opportunities, this third report builds upon the findings and research presented in Parts I and II of the series. Readers who are unfamiliar with the semiconductor manufacturing industry and the Orlando ecosystem are encouraged to read **Part I – An Industry and Ecosystem Primer.** Readers who wish to know more about the classifications of workers in the semiconductor manufacturing workforce and how skills-based practices can help solve talent pipeline constraints are encouraged to read **Part II – A Skills-Based Approach to Workforce Development.** These reports, along with supporting materials, can be found by visiting **Orlando.org/upskillsemiconductor.**

As a refresher, the semiconductor manufacturing workforce can be classified into three distinct categories: 1) Operators, 2) Technicians, and 3) Subject Matter Experts. Demand for all of these occupations will continue to grow. The United States is on a mission to reclaim global dominance in the chip wars that have been ongoing since the 1960s.[1] In August 2022, with the recognition that some of the most critical infrastructure in the country relies on semiconductors almost exclusively produced in East Asia, the federal government approved massive investment in America's semiconductor manufacturing capacity through the passage of the CHIPS and Science Act (the CHIPS Act). One year after the signing of the CHIPS Act, 27 semiconductor projects representing $155 billion in investment and 23,400 jobs were announced across the country.[2]

However, these 23,400 jobs have yet to be realized and it is not entirely clear where all these new workers will come from. As **Part II** of this series points out, a lack of awareness about the industry and the prevalence of foreign-born engineers means that the anticipated surge in demand for American semiconductor manufacturing workers far exceeds existing supply.

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(1) This is a reference to Chip Wars: The Fight for the World's Most Critical Technology, written by Chris Miller and published in 2022. Chip Wars lays out the history of semiconductor production with the founding of Silicon Valley and how continuous technological leaps put the US in a state of constant global competition with Russia, Japan, China, and others.

(2) https://www.jackconness.com/ira-chips-investments

To address this challenge, education and industry leaders in Orlando are building an education ecosystem to support the semiconductor manufacturing pipeline at all levels. New programs are currently being established in the region, and this report would soon be outdated if it attempted to capture every certificate or associate degree program within the Orlando region that aimed to serve the growing semiconductor manufacturing industry. Instead, a series of case studies and interviews with local educators and higher education leadership reveal that Orlando is creating a comprehensive ecosystem for semiconductor manufacturing workforce development.

Part III of this series does two things. 1) Uncovers the emerging synergies between the semiconductor industry and education institutions that are creating a strong ecosystem for skills-based development in Orlando, starting at the K-12 level and continuing through university-level research and development. 2) Shares stories of Orlando residents who were upskilled in the region and now work in the semiconductor manufacturing industry.

Orlando's Education Ecosystem

K-12 Education

In Orlando, a tech-focused high school along with many other magnet programs, is part of the ecosystem preparing students for future careers in STEM. NeoCity Academy is a project-based, STEM high school with strong industry connections.

Before highlighting NeoCity Academy in-depth, TABLE 1 below lists other, existing STEM-focused magnet programs in the Orlando region.[3]

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(3) NeoCity Academy is located in Osceola County.

TABLE 1: HIGH SCHOOL STEM MAGNET PROGRAMS IN ORLANDO REGION

HIGH SCHOOL	PROGRAM NAME	NOTES
Apopka High School	Advanced Engineering Applications Magnet	This program is focused on applying engineering principles to the real world and has an active robotics program that hosts previous graduates as competition judges. Students are eligible to receive multiple industry certifications related to robotics, unmanned ariel systems, and pre-engineering. In an interview with Michael MacWithey, the program director, Mr. MacWithey noted that the program works with local companies including Lockheed Martin and Northrop Grumman. He stated that one major challenge he sees in building the pipeline of engineers from high school is keeping students who go on to college, especially women, enrolled in the engineering track.
Colonial High School	Academy of Information Technology	"The National Academy Foundation Academy of Information Technology magnet promotes the study of digital media and information technology… Students can also receive instruction that fosters growth toward certification in the following areas: A+ PC Support, CISCO network training, Macromedia Web Design and Visual Basic and Java Programming."
Edgewater High School	Engineering, Science, and Technology (EST) Magnet	Mission statement – "To prepare students for top engineering, science, and technology programs in post-secondary institutions through the use of rigorous and relevant curricula and innovative instructional techniques applied in a real-world learning environment."
Liberty High School	Manufacturing Career and Technical Education Academy (in development as of 2023)	In 2022, Osceola County approved $2.1 million in funding to establish a manufacturing academy at Liberty High School. "The Academy fits a goal of preparing the workforce for careers at NeoCity – a 500-acre technology district that is well suited to lead the nation's domestic semiconductor production and to advance and accelerate existing investments in semiconductor research, development, and manufacturing."
Wekiva High School	Laser Photonics Academy	"Wekiva High School's Laser Photonics Academy Magnet is a four-year dual enrollment program offering courses in analog and digital circuits, photonics, lasers, and data communication. Enrollment is open to students entering 9th and 10th grades."

NEOCITY ACADEMY

NeoCity Academy is a public, STEM magnet high school in Osceola County, located in NeoCity, "a dynamic community that convenes collaboration between world-renowned universities, leading research institutions, and top-tier companies to create a vibrant ecosystem of smart sensors, photonics, and optics."[4] The 2023-24 school year is NeoCity Academy's sixth year of operations and 9th-grade enrollment, according to an interview with the school's Principal and Assistant Principal, Yvette Ponzoa and Julia Ullmann, is projected to double in the 2024-2025 academic year as an entirely new part of the campus is completed. Total enrollment will double by the start of the 2027-2028 academic year. Current student enrollment is 400+.

The project-based, STEM magnet high school exhibits characteristics that are extremely important for a K-12 school aiming to create a cutting-edge environment for their students and inspire a new generation of STEM professionals, including strong connections with universities and local industry. NeoCity Academy offers three programs of study: biodesign, engineering, and artificial intelligence (AI).

In an interview with Jonathan Motta, the school's Experiential Learning Coordinator, Mr. Motta noted that the AI program used to be a cybersecurity pathway, but NeoCity Academy worked with the University of Florida and the Florida Department of Education to create the first high school AI program in Florida.

In terms of industry connections, while internships are not a requirement for graduation, many students complete internships over the summer months with companies in Central Florida. This is one of the informal ways that students learn about different industries while companies build relationships with future employees. Mr. Motta noted that students have learned about opportunities in the semiconductor industry (located next door) through word-of-mouth. Students who had great experiences with semiconductor manufacturer, SkyWater, for example, come back and tell their friends, creating a natural pipeline of future interns. According to Mr. Motta, NeoCity Academy students have also interned with IMEC (a semiconductor research organization headquartered in Belgium with an office in NeoCity) and worked on one-off projects with Blue Origin (the aerospace manufacturer and defense contractor).

Mr. Motta noted that one of the general struggles he sees is that sometimes companies do not realize their students can work on real projects. "Our advanced curriculum with a focus on inquiry and project-based learning means our students are capable of more than just busy work. Students who have positive internship experiences with companies return to school with renewed excitement for their studies and recommend future opportunities with these organizations to their friends."

It is worth noting that NeoCity Academy has a competitive application process. According to files on the school's website, NeoCity Academy had an acceptance rate of 36 percent for the 2023-24 school year.[5] Principal Ponzoa explained that in the past, acceptance had primarily been focused on test scores but the school is looking to incorporate more holistic approaches to admissions moving forward, especially as the school's enrollment is set to double.

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(4) https://www.neocityfl.com/

(5) https://www.osceolaschools.net/domain/835

As the research capacity of NeoCity develops and grows, students at NeoCity Academy can be expected to benefit from the extreme proximity to industry. The projected doubling of enrollment suggests there is a strong appetite in the region for advanced, STEM-focused education. The school increases awareness about career opportunities in technical industries for high schoolers while building pipelines of talent for local companies.

In Orange County (just North of Osceola County where NeoCity Academy is located) there are many STEM-focused magnet programs and career and technical education (CTE) programs at regional high schools. Some of these programs are highlighted in TABLE 1 above. A review of these programs and outreach to program directors revealed that, as one might expect, these programs are designed to expose high schoolers to science and engineering principles. An interview with the magnet program director at Apopka High School, Michael MacWithey, revealed just how much awareness of these programs depends on having dedicated and consistent staff. According to Mr. MacWithey, the Apopka High program has connections with Lockheed Martin and Northrop Grumman.
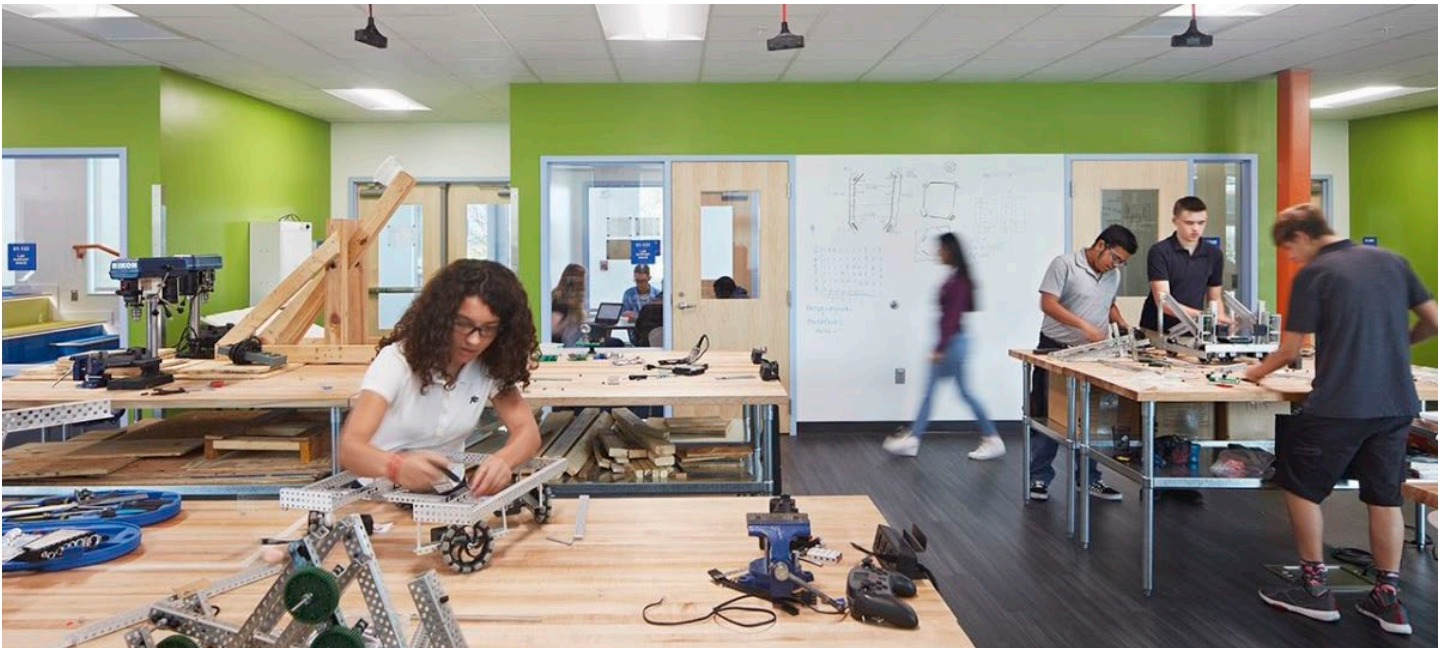

Image from https://educationsnapshots.com/projects/16019/neocity-academy/. Photographer, Mark Herboth.

As the industry grows in Orlando, Orange County Public Schools (OCPS) has plans to support the growing semiconductor manufacturing industry. Carol Tingley, Senior Administrator for Career and Technical Education at OCPS revealed that OCPS is planning to back the semiconductor manufacturing industry through its CTE programs. OCPS has a mechatronics[6] program that they are looking to double in size (in terms of enrollment) in the coming years, as well as bring back a previously offered program in electronic systems technology. The expansion of these programs would be contingent on receiving a Workforce Development Capitalization Incentive Grant (CAP Grant) from the Florida Department of Education.

Carol noted that there are many ways for OCPS CTE to work with industry and companies looking to fill specific roles and create rapid training programs.

Community College – An Integrated Suite of Credential and Degree Programs

Accelerated Skills Training

As the construction of more fabs is announced across the country, it is becoming clear that there is a need for a variety of training options for semiconductor operators (a job category defined in **Part II** of this series). An article from The Economist notes the need for training options longer than 10 days but shorter than a two-year associate degree.

> *"Once the fabs are built, they will need technicians to operate them. Such workers, responsible for tasks like inspecting tools and products, have historically required two years of training at a community college or a vocational school. But companies and educators have started experimenting with much shorter courses… There may soon be more in-between options."*[7]

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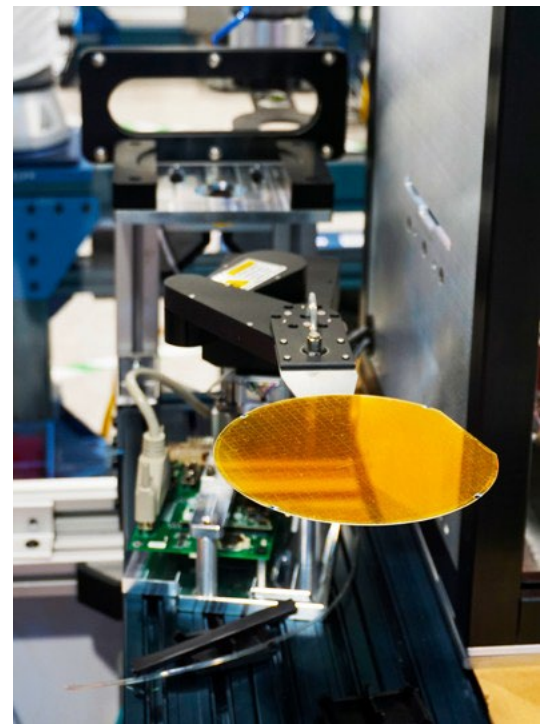
(6) Mechatronics refers to the skills needed to work with advanced, automated machinery in a manufacturing setting. It requires a combination of skills and knowledge about mechanics, electronics, computers, and software.

(7) https://www.economist.com/united-states/2023/08/05/america-is-building-chip-factories-now-to-find-the-workers

In Orlando, Valencia Community College has embraced this "in-between" route by investing in an advanced robotics lab and rapidly creating a 22-week technician course[8] to meet the future needs of the region.

In January 2022, Valencia College was awarded $3.7 million[9] to develop a new program, training students to utilize robotics technology. By October 2023, the Robotics and Semiconductor Technician program was up and running with its first full class of students prepared to graduate.

The program was built with industry feedback on the types of skills needed by workers and advanced machinery that students learn on comes directly from local companies.[10] The Robotics and Semiconductor Technician program is one of many Accelerated Skills Training programs at Valencia College.[11]

The ***Robotics and Semi-conductor Technician course*** is one of many ***accelerated skills training programs*** at Valencia College.

Part of the simulated manufacturing space at Valencia Community College, featuring robots built by students. Not pictured here, the clean room environment students learn to work inside as well.

(8) https://cs.valenciacollege.edu/ce/CourseListing.aspx?master_id=4269&master_version=1&course_area=CMT%20%20%20&course_number=1032%20%20%20&course_sub-title=00

(9) https://www.osceola.org/news/osceola-county-awarded-6-million-to-support-chip-and-semiconductor-manufacturing.stml

(10) https://www.osceola.org/news/osceola-county-awarded-6-million-to-support-chip-and-semiconductor-manufacturing.stml

(11) https://valenciacollege.edu/academics/accelerated-skills-training/index.php

VALENCIA COLLEGE, ROBOTICS AND SEMICONDUCTOR TECHNICIAN PROGRAM

LOCATION: Valencia College's Osceola campus. Classes take place in a working warehouse/lab environment where students are able to build the robots that help make semiconductors and create an entire manufacturing cell (sets of machines that are grouped by the products they create).

LENGTH: 22 weeks. The program offers both a daytime and an evening cohort that have classes Monday through Thursday. The daytime classes run from 7:00 a.m. to 2:30 p.m. The evening classes run from 2:30 p.m. to 10:00 p.m.

COST: The program costs $10,500, which is inclusive of all materials and items students would need to complete the program. Joe Battista, Vice President for Workforce Career & Professional Education, and Carolyn McMorran, Assistant Vice President of Professional and Continuing Education, both noted that most of the students who go through Valencia's accelerated skill programs are able to fund their continued education through some form of financial assistance.

SKILLS LEARNED: The program is heavily focused on the process used to make semiconductors (rather than the product) and understanding the complicated, precise, and essential robots used on the factory floor. The comprehensive educational experience simulates a manufacturing environment where students spend the first portion of the program unboxing the equipment and building, from the ground up, a working manufacturing cell. From there, students move on to the clean room environment, where they work on processes such as photolithography, debonding, metrology, etc. as well as managing the autonomous systems that assist with the creation of semiconductors. Roughly 80 percent of the program involves hands-on learning.

TARGETED OCCUPATIONS: Local semiconductor manufacturer, SkyWater, helped design the program, and "semiconductor technician" is in the title. However, the heavy focus on robotics and automation means that students are prepared to work in a wider array of industries than only semiconductor manufacturing. According to the program website, "today's manufacturing employees work in tandem with robots and computer-integrated manufacturing systems."[12] Robotics technician and robotics maintenance technician are other possible roles students may find themselves in upon graduation, covered in more detail below.

OUTCOMES FOR STUDENTS: The first cohort, a class of 12, had just graduated at the time of publication and many, if not all, of the students already had interviews lined up with potential employers. The robotics skills learned mean that students are not only prepared to become semiconductor technicians but could go on to work at a variety of advanced manufacturing companies. For example, one student had an interview lined up with Hine Automation, a designer and manufacturer of vacuum and atmospheric automation systems and robotic components, based out of St. Petersburg, Florida. (Students use Hine Automation robots in the class.)

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(12) Landing page for the robotics and semiconductor technician program

The accelerated skills programs at Valencia are unique because they remove barriers for individuals looking to continue their education. The entry requirements for these programs are minimal and the time commitment is much more manageable. Many students work the entirety of the course into the pace of their normal lives because it is accelerated and shorter than a two-year degree program.

A New Associate Degree and Connections with University-Level Training

Excitingly, those students who find that they enjoy the 22-week robotics and semiconductors program will soon be able to enroll in an associate degree track at Valencia College. Titled "Semi-conductor Engineering Technology", the framework for the new Associate of Science (AS) degree was approved by the State of Florida in late October 2023 and Valencia may be able to offer the new degree as early as Fall 2024. Any state college can now offer the degree program, not only Valencia. However, having been designed by local industry and Valencia staff, the AS degree will heavily complement the 22-week training course. Students will not need to retake certain classes or elements but will dive deeper into the technical aspects of semiconductor design.

Finally, to fully build out the picture of just how integrated and comprehensive Orlando's education ecosystem is, note that Valencia College, in partnership with the University of Central Florida (UCF) is building out the connection point for a 2+2 program. Similar to the Direct Connect program (where students complete a general associate of arts degree at Valencia and are guaranteed admission to UCF to complete a bachelor's degree) students who complete their AS degree in Semiconductor Engineering Technology at Valencia College could then be automatically admitted to the corresponding bachelor-level program being built at UCF.

University-Level Research & Development

At the University of Central Florida there are multiple research activities and facilities that are contributing to the development of a semiconductor manufacturing ecosystem in Orlando.

UCF's Office of Research centrally operates three complementary cleanrooms across several colleges. On the website for each cleanroom, users can find information on the specific equipment housed there and instructions for how interested industry users can access the cleanrooms. Additionally, advanced materials are a key component for emerging semiconductor devices. UCF's NanoScience Technology Center (NSTC) performs cutting-edge research in materials and nanotechnology, provides high quality training for students and facilitates innovation in a number of semiconductor-related technologies. Note that UCF currently offers a Master of Science in Nanotechnology.

Looking beyond cleanrooms, there is a specific project happening at the School of Modeling, Simulation, and Training (SMST) at UCF that will accelerate the advanced packaging capabilities of semiconductor manufacturers in the region. The SMST is building a digital twin of the semiconductor production facilities at NeoCity in Osceola County. A digital twin is a digital replication of real-world objects or systems. The twin allows leaders, production managers, planners and others to see and evaluate the results of a specific action before it is implemented. The UCF digital twin has the opportunity to be a cutting-edge and transformative project that hones a new type of talent and attracts companies that recognize the value of university partnerships. More detail about the digital twin can be found on the next page.

Finally, a conversation about UCF's role in the semiconductor education ecosystem would not be complete without noting that the university has accelerated the development of a new undergraduate degree in semiconductor manufacturing. The new program is part of $3.1 million dollars in recurring investment into UCF's semiconductor manufacturing program capabilities and $10.8 million in nonrecurring funds. New faculty are being hired from across the country, new equipment is being secured, and the program itself will include year-round, on-campus cleanroom co-op positions in partnership with local industry.[13]

The UCF digital twin has the opportunity to be *a cutting-edge and transformative project that hones a new type of talent* and attracts companies that recognize the value of university partnerships.

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(13) https://www.cecs.ucf.edu/web/wp-content/uploads/2022/10/Semiconductor-Sci-ence-and-Manufacturing-at-UCF-RAbdolvand-10-22-2022.pdf

UCF'S DIGITAL TWIN FOR SEMICONDUCTOR MANUFACTURING

WHAT: A digital replication of the semiconductor production facility at NeoCity's Center for NeoVation. The digital twin will help accelerate the capabilities of the local industry by transforming the way production planning and manufacturing is done. With a digital twin, things such as operational efficiency, capacity, and throughput can all be modeled rapidly (eventually in real-time) and with increased accuracy.

WHY: Orlando's niche in the semiconductor manufacturing industry is in advanced packaging, which is the design and creation of specialized chips. Oftentimes these chips are used in sensitive, defense applications. (See **PART I** of this series for a deeper dive into advanced packaging and Orlando's competitive advantages in this space.)

Semiconductor foundries that focus on advanced packaging are not the same as the massive fabs being built in Phoenix, AZ, or Columbus, OH. They do not produce millions of the same chip, over and over. They are low-to-mid-volume, specialized producers. Advanced packaging fabs might require multiple configurations of their tools throughout the day, moving products around the fab to various machines and in different orders depending on the product.

A digital replica of an advanced packaging fab allows users to do things such as: test different configurations, explore where a bad batch of chips may have gone wrong, and prototype new chip configurations all without having to tinker with the equipment in real life.

HOW: UCF received $8.8 million dollars to build a digital twin for the semiconductor industry from the region's Economic Development Administration (EDA) Build Back Better award in 2022. Some of the funding, according to Dr. Grace Bochenek, the Director of the School of Modeling, Simulation, and Training, is going toward the purchasing of advanced tools, collaborative lab space, and high-performing computing assets. "The EDA funding was foundational to being able to set up this project," said Dr. Bochenek.

REGIONAL ADVANTAGES AND IMPLICATIONS: Dr. Bochenek summed up the implications of this project with a list of the two main things it will accomplish. First, it will accelerate the semiconductor industry in Orlando and attract talent to the region. "Think about Moore's law and the observation that the number of transistors that can fit on an integrated circuit doubles every two years. That has proven to be true over time. Now imagine just how much exponential growth the industry will experience when digital prototyping and production capabilities are put into the mix." Second, the project gives the modeling, simulation, and training industry another applicable use case. "Modeling and simulation requires expertise in a variety of fields from AI to data science to cybersecurity. And we have deep expertise in these areas in Central Florida, so it is exciting to see the semiconductor industry take advantage of this."

An Ecosystem Designed for Upskilling

In an interview with Ben Larry, the head of Human Resources for SkyWater, Ben highlighted how the certificate programs at Valencia have already created a pipeline of talent for SkyWater and entry points into good jobs for residents. Before the Valencia robotics program existed, SkyWater hired multiple people based on connections made with individuals who went through Valencia's mechatronics program. The stories of two of these individuals, as told by Ben, are shared below and highlighted because they serve as amazing examples of individuals entering an advanced industry with no previous experience.

CORY – COOK TO MAINTENANCE TECHNICIAN

Cory moved to Central Florida from New York because of the lower cost of living and worked as a cook and then chef for several restaurants. During this time, he met someone who happened to tell him about the mechatronics program at Valencia College where he later enrolled as a student. Cory had no technical background but exhibited such a strong motivation to learn and grow. The mechatronics program director called Ben at SkyWater to tell him about this student who seemed to be a good fit for the jobs SkyWater was looking to fill.

SkyWater took Cory on initially as an intern, moving him from an Equipment Intern to a Facilities Intern role until they found the right fit. CareerSource (the state workforce board)[14] helped pay for the first 12 weeks of Cory's internship, after which SkyWater offered Cory full-time employment and worked with him to continue to develop his confidence and leadership skills. A year and a half later, Cory is working full-time at SkyWater as a Plant Maintenance Technician on the night shift.

(14) "CareerSource Florida is the statewide workforce policy and investment board of business and government leaders charged with guiding workforce development for the state of Florida. CareerSource Florida provides oversight and policy direction for talent development programs administered by the Department of Commerce, Florida's local workforce development boards and their 100 career centers." See their website at https://careersourceflorida.com/

ANITA – UNHOUSED TO EQUIPMENT TECHNICIAN

Anita's story, from a workforce development perspective, is similar to Cory's. Anita was also told by someone about the Valencia mechatronics program which eventually led to employment at SkyWater. Before this, Anita must have overcome massive barriers to even reach the enrollment in the mechatronics program, given that she experienced homelessness for a time and had to return to school to earn her GED.

After she completed the program at Valencia, Anita went on to work as a Maintenance and Control Technician for the cable car company that operates Disney and Universal transportation systems at the theme parks. During this time, Anita transitioned from student to instructor when she was asked back to Valencia to help teach the mechatronics program. While teaching courses at Valencia, she met an employee at SkyWater who shared Anita's story with Ben.

From this connection, SkyWater partnered with CareerSource to bring Anita on as a paid intern and eventually offered her a full-time position. Today Anita is a full-time Equipment Maintenance Technician with SkyWater and is continuing her advancement through the industry by being one of the first to graduate from the new robotics program at Valencia. SkyWater has offered to help Anita continue her education and earn an AS degree in semiconductor manufacturing once Valencia begins enrollment in the newly designed AS program (covered in more depth above).

These brief but powerful stories showcase four qualities Orlando's education ecosystem possesses that are critical for upskilling residents.

1. A community college system that is connected to the people it aims to serve. Cory and Anita were both told about the Valencia mechatronics program by someone else who was familiar with it. The power of personal connections and word of mouth should never be ignored.

2. A community college system that is connected to industry. Connections and relationships formed between program directors and the heads of HR turn matriculators into employees.

3. Support organizations to fill cracks and remove barriers during worker transitions. CareerSource Central Florida helped pay for Cory and Anita's internships, reducing the risk to employers while helping Cory and Anita support themselves and their families financially during a transitionary period.

4. A business ecosystem that understands the long-term value gained from investing in its workers. SkyWater's willingness to create flexible entry points to employment and invest in their workers' continued education, makes for a prime example of how industry must also take part in a successful workforce system.

Conclusion

In summary, a clear picture of the workforce development ladder in Orlando is forming. Ranging from high school all the way to graduate studies, there are entry and exit points into the workforce development system for residents (and companies) who want to further their (employees) education.
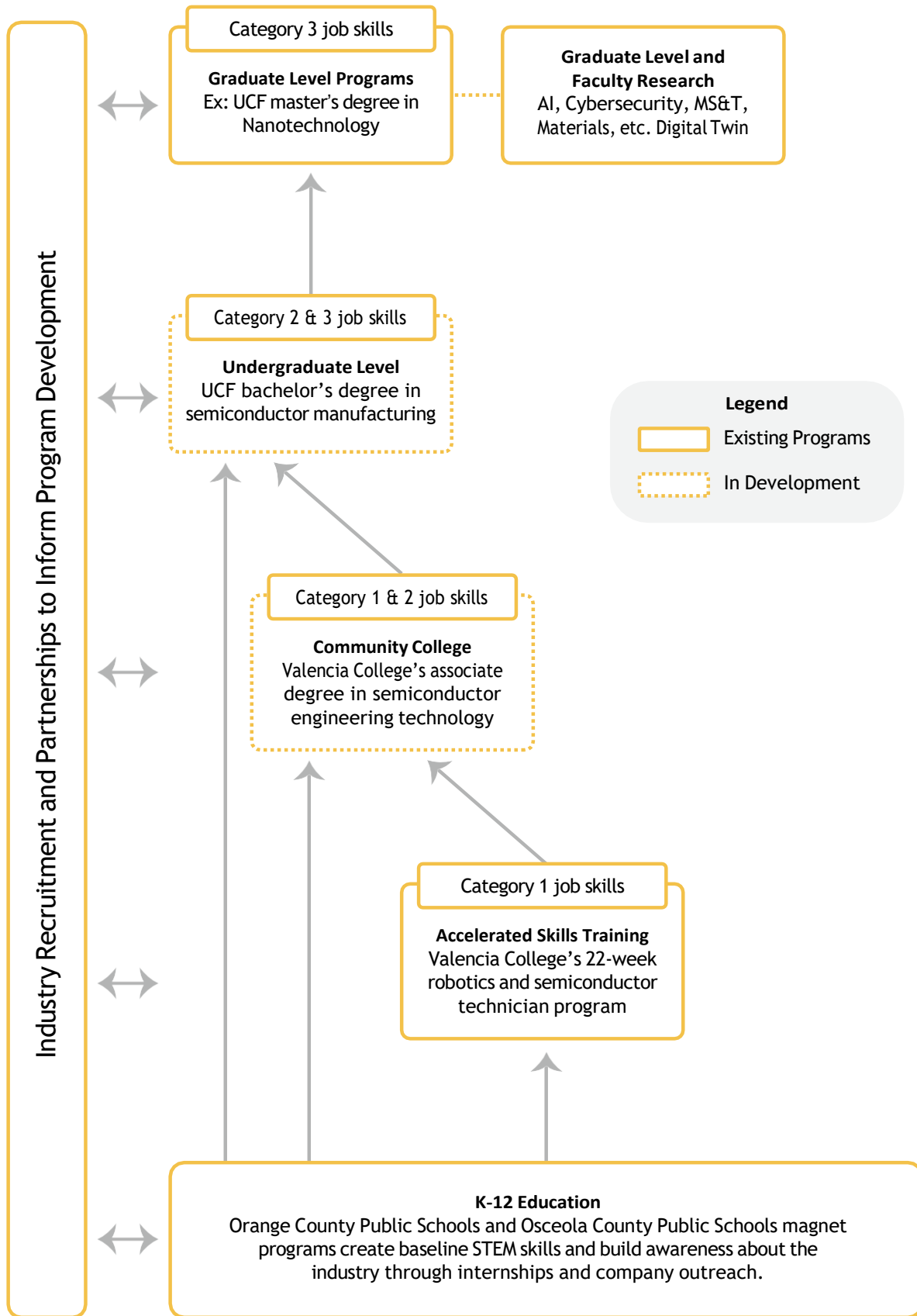
The ecosystem map below outlines the different programs and connection points that have been covered in this report. Dashed lines around a program signal that it is still in development and not currently (as of January 2024) offered in the region. Solid boxes show programs that are already in existence.

Visually, this shows how Orlando has the foundational capabilities to develop residents' skills, thanks to specialized K-12 programs and Valencia's new Robotics and Semiconductor Technician program. This program (and other Accelerated Skills Training programs at Valencia College) will help prepare workers for category one jobs in the semiconductor manufacturing industry.

Orlando also has graduate-level and faculty-level research capabilities that help develop and attract employees primed to be category three workers, called subject matter experts. The digital twin of industry production lines built by UCF will bring experts in AI, computing, cybersecurity, simulation, etc. into the realm of the semiconductor manufacturing industry and increase awareness about this specific industry's needs among subject matter experts in related fields.

Where education leaders and industry have already laid the groundwork for increased investment, is the middle tier of jobs; creating programs that prepare workers for category two, advanced technician and entry-level engineering, positions. The associate degree and bachelor's degree programs that are being developed in the region will help develop the category two skills that are needed in the industry. Again, see **Figure 1** on the following page.

Category 3 job skills

Graduate Level Programs
Ex: UCF master's degree in
Nanotechnology

**Graduate Level and
Faculty Research**
AI, Cybersecurity, MS&T,
Materials, etc. Digital Twin

Category 2 & 3 job skills

Undergraduate Level
UCF bachelor's degree in
semiconductor manufacturing

Legend
Existing Programs
In Development

Category 1 & 2 job skills

Community College
Valencia College's associate
degree in semiconductor
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Category 1 job skills

Accelerated Skills Training
Valencia College's 22-week
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K-12 Education
Orange County Public Schools and Osceola County Public Schools magnet
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industry through internships and company outreach.

Industry Recruitment and Partnerships to Inform Program Development

Viewed holistically, the ecosystem map shows how Orlando leaders are creating a fully integrated suite of programs that prepare residents for positions across the spectrum of semiconductor manufacturing jobs. The industry relationships between manufacturers such as SkyWater and Valencia College ensure that the forthcoming associate degree program will be relevant to the skills workers need. The unique relationship between Valencia College and the University of Central Florida, i.e. the 2+2 program for students who finish an AS degree at Valencia and go on to receive their semiconductor-manufacturing-related bachelor's degree at UCF, will expand the pipeline of prepared talent by lowering barriers to higher education access.

Finally, the stories about Cory and Anita, two SkyWater employees with no previous experience in the industry, reveal that Orlando is also primed to expand skills-based development efforts. Cory and Anita found their footing in semiconductor manufacturing through a series of accelerated skill credential programs, community development support through CareerSource Florida, and company internships. Once again, these stories serve as a reminder of the importance of industry and community college relationships. They also provide two more proof points in the argument for skills-based hiring, the processes by which potential employees are evaluated based on the knowledge, skills, and abilities they bring to the table.

For more information on how to capitalize on these regional assets or to connect on workforce development efforts, **contact Tammy Humphrey at the Orlando Economic Partnership**.

Tammy Humphrey

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Appendix - Referenced Programs

Programs and schools covered in this report are included in **TABLE 2** below. **TABLE 2** includes existing and in-development* semiconductor-related training programs in the Orlando region as of October 2023. This appendix summarizes the programs that are specifically mentioned in this report. Students may learn the skills they need in other programs such as electrical engineering, chemistry, optics and photonics, etc., those programs are not covered here. For an extensive list of semiconductor-adjacent academic programs, see the **Orlando Economic Partnership's Semiconductor Sector Brief**.[15]

TABLE 2: SCHOOLS AND PROGRAMS COVERED IN THIS REPORT

PROGRAM LEVEL	LOCATION	PROGRAM OR DESCRIPTION	FOR MORE INFORMATION VISIT
High School	NeoCity Academy, Osceola County	Public, competitive application, STEM-focused high school	**Program Details**
	Apopka High School, Orange County	Advanced Engineering Applications Magnet	**Program Details**
	Colonial High School, Orange County	Academy of Information Technology	**Program Details**
	Edgewater High School, Orange County	Engineering, Science, and Technology (EST) Magnet	**Program Details**
	Wekiva High School, Orange County	Laser Photonics Academy	**Program Details**
	Liberty High School, Osceola County	Manufacturing Career and Technical Education Academy	In development as of 2023.
Certificate or Certification	Valencia College, Osceola Campus	Robotics & Semiconductor Technician	**Program Details**
	Valencia College, Osceola Campus	Industrial Automation Technician (Mechatronics)	**Program Details**
	Valencia College, Osceola Campus	Precision Optics, Photonics, and Fiber Optics Technician	**Program Details**
	University of Central Florida	Semiconductor Science and Engineering Certificate*	In development as of Oct. 2023.
Associate's Degree	Valencia College	Semiconductor Engineering Technology*	Framework approved by the State. Curriculum in development as of Oct. 2023.
Undergraduate Minor	University of Central Florida	Semiconductor Science and Engineering*	In development as of Oct. 2023.
Graduate Degree	University of Central Florida	Nanotechnology	**Program Details**

(15) https://business.orlando.org/l/semiconductor-industry-cluster/

About the Orlando Economic Partnership
The Orlando Economic Partnership is a public-private, not-for-profit economic and community development organization. The Partnership represents seven counties in Central Florida, including the City of Orlando, and hundreds of the region's top private businesses.

Through the power of our partnerships, we strengthen our regional assets and businesses, advocate for regional priorities and write the next chapter of Orlando's story. We are injecting fresh resources and perspectives while harnessing the strength of the region's culture of collaboration and innovation to create a new future for our diverse and growing population.

About the Foundation for Orlando's Future
The Foundation for Orlando's Future provides analytical insight, strategic foresight and leadership development to inform and drive the region's pursuit of quality job creation, economic growth and broad-based prosperity by educating and empowering community leaders.

This report was made possible through the generous contributions of

JPMORGAN CHASE & CO.

A special thank you to these contributors (listed in order of reference):

Michael MacWithey – Program Director,
Advanced Engineering Applications Magnet, Apopka High School
Yvette Ponzoa – Principal, NeoCity Academy
Julia Ullmann – Assistant Principal, NeoCity Academy
Jonathan Motta – Experiential Learning Coordinator, NeoCity Academy
Carol Tingley – Senior Administrator,
Career & Technical Education, Orange County Public Schools
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Career & Professional Education, Valencia College
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The Foundation for Orlando's Future is a core Component of the Orlando Economic Partnership