TECHNOLOGY & INNOVATION COLLABORATIVE

NJ PATHWAYS
TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce

WELCOME

Mark McCormick,
J.D., Ed.D.

President
(Middlesex College)

NJ PATHWAYS
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OPENING REMARKS

Dr. Aaron Fichtner

President
(NJCCC)

Chris Emigholz

Chief, Government
Affairs (NJBIA)

AGENDA

- Middlesex College's Computer Science A.S.

- Ocean County College's Computer System Tech A.S.

- Pathways of the Center of Workforce Innovation for Programming and Software Development

- Industry Panel Discussion

NJ PATHWAYS
TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce

Dr. Aslihan Cakmak, Chair, Business &
Computer Science Department

Dr. Linda Scherr,
Vice President, Academic Affairs

MIDDLESEX
COLLEGE

Middlesex College Mission

The mission of Middlesex College is to provide access to a quality, affordable education for a diverse population, to support student success for lifelong learning, and to strengthen the economic, social and cultural life of the community.

MIDDLESEX COLLEGE

Computer Science Degrees at Middlesex College

Programming and Software Development - Center of Workforce Innovation

- **Transfer Degree**
  - Computer Science – Transfer A.S. (Fall 2021: 506 students)
- **Workforce Degrees and Certificates**
  - Computer and Information Systems A.A.S. (Fall 2021: 174 students)
  - Computer Programming Certificate (Fall 2021: 26 students)
  - Java Programming Certificate of Achievement (Fall 2021: 2 students)
  - Java and Web Programming Certificate of Achievement (Fall 2021: 2 students)
  - Network Administration and Support A.A.S. (Fall 2021: 43 students)
  - Network Administration Certificate (Fall 2021: 2 students)
- **Other Computer Science-based Degrees**
  - Business Information Systems A.A.S. (Fall 2021: 85 students)
  - Cybersecurity A.A.S. (New)
  - Data Science and Analytics A.S. (New)
  - Data Science and Analytics Certificate (New)

MIDDLESEX COLLEGE

Middlesex College Computer Science Faculty and Facilities

- **Faculty**
  - 9 full-time faculty with Master's and/or Doctorates in Computer Science
  - 28 part-time faculty with Master's and/or Doctorates in Computer Science and Information Technology
- **Facilities**
  - 12 dedicated computer laboratories, including up-to-date integrated development environment (IDE) such as Eclipse and Textpad
  - 300 physical Windows desktops
  - Maintained by the Information Technology Department
  - Managed by two full-time Senior Laboratory Coordinators
- **Student Support**
  - Open labs, staffed by Student Teaching Assistants
  - Monday-Friday
  - Provide flexibility to students to complete assignments and build their programming skills

MIDDLESEX COLLEGE

Computer Science – Transfer A.S.

- 14 community colleges offer Computer Science A.S. degrees
- Middlesex College's degree program was first offered in 1993
- The 60-credit degree program prepares students for successful transfer to Computer Science B.S. programs at four-year institutions
- Students may complete 75% of the degree online
- Enrollment:
  - 500-600 students each year
  - Roughly 50% full-time/50% part-time attendance
  - 81% male
  - 34% Asian / 11% Black / 20% Hispanic / 20% White / 15% All Others
- 278 graduates in the last 5 years; 75% transferred immediately after graduation
  - Top Transfer Destinations:
    - Rutgers University – New Brunswick (127)
    - New Jersey Institute of Technology (37)
    - Kean University (17)

MIDDLESEX COLLEGE

Computer Science – Transfer A.S.
500-600 Students Enrolled

Program Learning Outcomes – Graduates will be able to

1. Apply problem solving techniques to develop programs of moderate complexity using the object-oriented paradigm and the appropriate data structures.

2. Use an assembly language to write programs.

3. Explain the architecture of a computer.

4. Demonstrate advanced mathematical concepts by programming in the area of calculus and discrete mathematics.

Computer Science A.S. Core Courses:
- CSC 161 – Intro to Computer Science using Java
- CSC 162 – Object-Oriented Programming using Java
- CSC 236 – Data Structures in Java
- CSC 263 – Computer Organization & Architecture I
- CSC 264 – Computer Organization & Architecture II
- Calculus I, II, Discrete Mathematics, Linear Algebra

Technical Elective (choose one):
- CSC 116 – Intro to Information Systems Security
- CSC 205/206 – Comp. Science Work Experience I/II
- CSC 225 – Systems Analysis and Design
- CSC 239 – Database Concepts

General Education

Computer Science Certificates

Java and Web Programming Certificate of Achievement (18 credits)

- first offered in 2008-09
  - **CSC 125 – Web Markup Languages**
  - **CSC 162 – Object-Oriented Programming using Java**
  - **CSC 239 – Database Concepts**
  - **CSC 241 – Web Programming**
  - **CSC 245 – UNIX and Shell Programming**

CURRENT   PROPOSED

Java Programming Certificate of Achievement (16 credits) - first offered in 2008-09

- **CSC 161 – Intro to Computer Science using Java**
- **CSC 162 – Object-Oriented Programming using Java**
- **CSC 245 – UNIX and Shell Programming**
- **CSC 2XX – 200-level Programming Elective**

Technical Elective (choose one):
- CSC 211 – Programming in Java
- **CSC 236 – Data Structures in Java**
- **CSC 241 – Web Programming**

Java Programming Certificate of Achievement (16 credits) - first offered in 2008-09

- **CSC 161 – Intro to Computer Science using Java**
- **CSC 162 – Object-Oriented Programming using Java**
- **CSC 236 – Data Structures in Java**
- ~~CSC 245 – UNIX and Shell Programming~~
- **CSC 2XX – 200-level Programming Elective**

Technical Elective (choose one):
- **CSC 241 – Web Programming**
- **CSC 245 – UNIX and Shell Programming**

Replace requirement for CSC245 with CSC 236 – Data Structures in Java; Students can earn Oracle certification, critical for employability for entry-level programmers

MIDDLESEX COLLEGE

Courses in **boldface** stack into the Computer Science-Transfer A.S. and or Computer and Information Systems A.A.S. Degrees

Careers

- With an Associate Degree, a Certificate, or a Certificate of Achievement, graduates are qualified for a range of jobs including:
  - Computer System Analyst
  - Computer Systems Engineer/Architect
  - Junior Computer Programmer
  - Junior Software Engineer
  - Junior GUI Developer
  - Software Quality Assurance Analyst and Tester
  - Web and Digital Interface Designer
  - Web Developer

Program Enhancements at Middlesex (Fall 2022)
Aligned with work of the Center of Workforce Innovation

- Fully online degree completion

- New marketing of bridge from Workforce Programs (non-credit) to credit Degrees and Certificates

- Enhanced advisement for stacking Certificates of Achievement and Certificates into Degree pathways

- Industry certifications embedded into Degrees, Certificates, and Certificates of Achievement so all Computer Science students graduate with one or more credentials in addition to their diplomas

- Development of new industry credential pathways, including Amazon Web Services (Cloud Computing) specialization – for Computer Science and Business majors

- Expanded course offerings in Python programming language, which will serve Computer Science majors, and students interested in Cybersecurity, Data Science, and other majors

Industry Certifications

Incoming students who have earned industry certifications get a jump start on their Certificate or Degree

Industry Certifications → **Course Equivalency Granted**

Course Sequence → **Embedded Industry Certifications**

Students graduate with a Degree or Certificate and one or more industry certifications

MIDDLESEX COLLEGE

Computer Science A.S. Pathway Map to Industry Certifications

	Course ID	Credits	Industry Exam	Industry Certification
First Semester	CSC 161 – Introduction to Java	4		
Second Semester	CSC 162 – Object-Oriented Programming using Java	4		
	Technical Elective (1) CSC 116 – Intro to Information Systems Security OR CSC 239 – Database Concepts	3	CompTIA Security+ Oracle Database SQL 1Z0-071	CompTIA Security + Oracle Database SQL Certified Associate
Third Semester	CSC 236 – Data Structures in Java	4	Oracle 1Z0-808 (after completion of CSC 161, 162, 236)	Oracle Certified Associate Java SE 8 Programmer
	CSC 263 – Computer Organization & Architecture I	3		
Fourth Semester	CSC 264 – Computer Organization & Architecture II	3		

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Embedded Industry Certifications

Computer Science A.S. Core Courses:
- **CSC 161 – Intro to Computer Science using Java**
- **CSC 162 – Object-Oriented Programming using Java**
- **CSC 236 – Data Structures in Java**
- CSC 263 – Computer Organization & Architecture I
- CSC 264 – Computer Organization & Architecture II
- Calculus I, II, Discrete Mathematics, Linear Algebra

Technical Elective (choose one):
- CSC 116 – Intro to Information Systems Security
- CSC 205/206 – Comp. Science Work Experience I/II
- CSC 225 – Systems Analysis and Design
- **CSC 239 – Database Concepts**

General Education

Oracle Certified Associate and **Java SE 8 Programmer** Certifications embedded in the program at the end of the 3rd semester.

Students who complete three semesters of the program and complete CSC 239 will take the **Oracle Database SQL 170-071 Exam**.

MIDDLESEX COLLEGE

High School Partnerships

- Dual Enrollment Computer Science courses with area high schools
  - New partnership with Thomas Edison EnergySmart Charter School

- Incoming students get course credit for AP Exams:
  - Computer Science Principles (score of 3 or higher) – credit for CSC 105, Computer Applications and Systems
  - Computer Science A (score of 3 or higher) – credit for CSC 161, Introduction to Computer Science Using Java

Dhruv Chunawala

Computer Science A.S., 2014; Computer Science Faculty Member (2022-)

Prior to his hire as a tenure-track faculty member, Dhruv worked at Middlesex College as a Computer Science tutor and, later, as an adjunct faculty member.

After completing his Associate Degree, Dhruv earned a B.S. in Computer Science from Rutgers University – New Brunswick, and an M.S. in Software Engineering and M.B.A. from the New Jersey Institute of Technology (NJIT).

Dhruv's industry experience includes seven years as a Senior Software Engineer at UnitedHealth Group, where he focused on architectural design and implementation and engaged in cross-functional teams.

Dhruv keeps up with new technologies and tools and has earned 25+ industry certifications (IBM, Google, Microsoft), most recently becoming an AWS Certified Cloud Practitioner and AWS Certified Solutions Architect.

Dhruv is also interested in the use of technological tools to support exploration and expression across diverse contexts, including science, technology, engineering, and informal spaces. His work lies at the intersection of human-computer interaction, design, and learning sciences.

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Dhruv Chunawala

Computer Science A.S., 2014; Computer Science Faculty Member (2022-)

One of his favorite quotes is, "*If you can't figure out your purpose, figure out your passion. For your passion will lead you right into your purpose.*" T.D. Jakes

He believes that no matter what your background is, anyone can learn how to code as long as they have the right tools and guidance.

He has a passion for helping students learn computer science concepts and programming fundamentals.

His passion for Teaching and Technology has led him to his purpose to inspire students to learn and continue their education at and beyond Middlesex College by providing the knowledge, skills, professionalism, and drive for lifelong learning needed for future careers in the Information Technology field.

MIDDLESEX COLLEGE

Bridging the Gap

Expanding postsecondary education and workforce opportunities for our community.

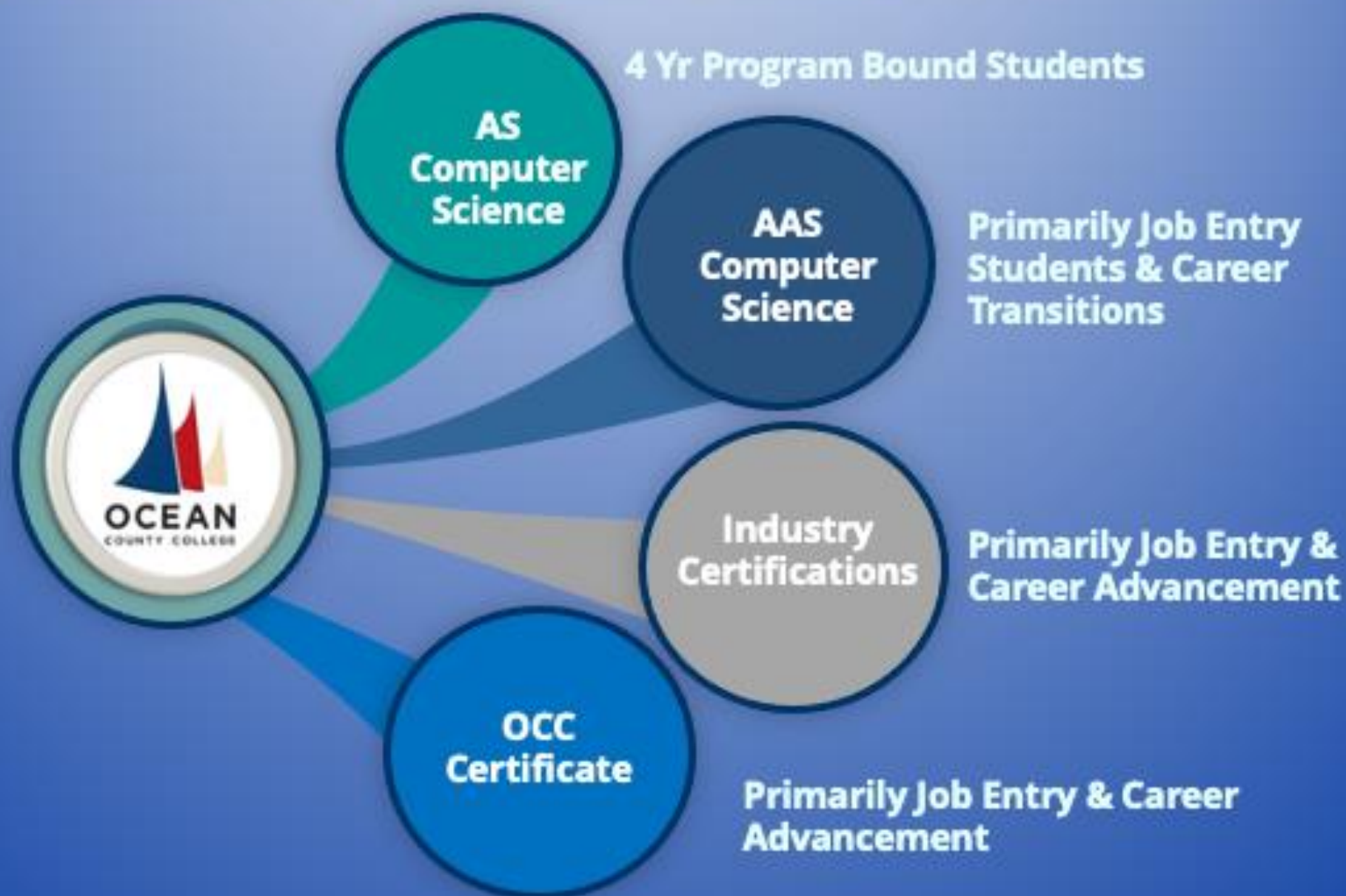OCEAN
COUNTY COLLEGE

Computer Science & Information Technology

- Started in 2005
- Currently 334 students
- Number graduated past 3 years
  - 2022 - 54
  - 2021 - 56
  - 2020 - 45

OCEAN
COUNTY COLLEGE

CSIT Programs at OCC

Computer Science and Information Technology (CSIT) offers the following programs:

Associate of Science (AS)	Associate in Applied Science (AAS)	Certifications
• Computer Science • Information Technology • Cyber-Information Security • Game Development and Design • Artificial Intelligence	• Information Technology • Cyber-Information Security* • Artificial Intelligence • Computer Technology • Information Technology	• Artificial Intelligence • CyberSecurity • Information Technology

COMPUTER SCIENCE WITH INFORMATION TECHNOLOGY OPTION
ASSOCIATE IN SCIENCE

Semester			Credit Hours
1	ENGL 151	English I	3
1	CSIT 165	Programming I	4
1	Humanities Gen. Ed. Requirement		3
1	Social Science Gen. Ed. Requirement		3
1	STSC 150	Student Success Seminar	2
		Credit Hours	15
2	ENGL 152	English II	3
2	MATH 265	Calculus I	4
2	CSIT 166	Programming II	4
2	CSIT 176	Computer Organization & Architecture	3
2	Humanities or Social Science Gen. Ed. Requirement		3
		Credit Hours	17
3	MATH 266	Calculus II	4
3	CSIT 185	Networking I	3
3	CSIT 265	Data Structures and Analysis	4
3	Select one to fulfill the Lab Science Gen. Ed. Requirement: BIOL161, CHEM 181, PHY 281		4
		Credit Hours	15
4	CSIT 213	Database Management	3
4	Select one to fulfill the Lab Science Gen. Ed. Requirement: BIOL162, CHEM 182, PHY 282		4
4	Elective to meet 60 credits		6
		Credit Hours	13
		Total Credit Hours	**60**

COMPUTER SCIENCE WITH CYBER-INFORMATION SECURITY OPTION, ASSOCIATE IN SCIENCE

Semester				Credit Hours
1	ENGL 151	English I		3
1	MATH 265	Calculus I		4
1	CSIT 165	Programming I		4
1	Humanities Gen. Ed. Requirement			3
1	STSC 150	Student Success Seminar		2
			Credit Hours	16
2	ENGL 152	English II		3
2	MATH 266	Calculus II		4
2	CSIT 144	Introduction to Operating System Using Unix		3
2	CSIT 185 or CSIT 184	Networking I or Networking Essentials		3
2	Humanities or Social Science Gen. Ed. Requirement			3
			Credit Hours	16
3	MATH 270	Discrete Mathematics		3
3	CSIT 200	Information Security Fundamentals		3
3	CSIT 212	Systems Analysis		3
3	Select one to fulfill the Lab Science Gen. Ed. Requirement: BIOL 161, CHEM 181, PHYS 281			4
3	Social Science Gen. Ed. Requirement			3
			Credit Hours	16
4	CSIT 213	Database Management		3
4	Computer Science (CSIT) or Criminal Justice (CRIM) Elective			3
4	Select one to fulfill the Lab Science Gen. Ed. Requirement: BIOL 162, CHEM 182, PHYS 282			4
4	Elective to meet 60 credits			2
			Credit Hours	12
			Total Credit Hours	**60**

AAS Degrees Align with Industry Credentials

Computer Science – Cyber Security

English 1
Gen Ed Math
Intro to Stats
Programming 1
Operating Systems UNIX
Gen Ed Requirement
Networking 1
Computer Org& Arch
Security Fundamentals
Gen Ed Requirement
Programming 2
Cyber Legal & Regulatory
Certified Ethical Hacker
Lab Science
Database Management
Computer Science Electives (2)
Business Elec or Internship
Cloud Computing

19 Courses/ 60 Credits

Semester	Course ID	Course Description	Credits	Comp TIA A+	Comp TIA Networks	Comp TIA Securitys	Certified Ethical Hacker	OCC – IT Certificate	OCC Cyber Certificate
1	ENGL 151	English 1	3						
1	GEN	Gen Ed Math	3						
1	MATH 156	Intro to Stats	3						
1	CSIT 165	Programming 1	4					X	
1	CSIT 144	Intro to Operating Systems using UNIX	3	X					X
2	GEN	Gen Ed Requirement	6						
2	CSIT 185	Networking 1	3	X	X				X
2	CSIT 176	Computer Organization and Architecture	3	X					
2	CSIT 200	Security Fundamentals	3			X			X
3	GEN	Gen Ed Requirement	6						
3	CSIT 166	Programming 2	4					X	
3	CSIT 241	Cyber Legal & Regulatory	3						X
3	CSIT 240	Certified Ethical Hacker	3				X		X
4	GEN	Lab Science	4						
4	CSIT 213	Database Management	3					X	
4	GEN	Computer Science Electives (2)	6					X	
4	GEN	Business Elective or Cyber Internship	3						
4	CSIT 277	Cloud Computing	3						X
		Total Credit Hours	60	9	3	3	3	17	18

Bridging and Prior Learning Assessment

Industry Credential	WPE Course	Credit Course	Credits
Google IT Support	Google IT	CSIT 100, CSIT 185, CSIT 144, CSIT 200	12 credits
Comp TIA A+	Comp TIA A+	*In redesign	3 credits
Comp TIA Network+	Comp TIA Network+	CSIT 185	3 credits
Comp TIA Security+	Comp TIA Security+	CSIT 200	3 credits
Cisco PCAP Programming Essentials in Python	Python	CSIT 168	2 credits
Cisco CCNA	In development	In development	
Cisco Cyber Ops	In development	In development	
Microsoft Azure	In development	In development	
Amazon AWS	In development	CSIT 277	3 credits
Ethical Hacker		CSIT 240	3 credits

*DRAFT

Educational Partners

- ✓ Camden Dream Center
- ✓ Lakewood High School
- ✓ P-TECH
- ✓ Rowan University

Our First Success Story

Computer Science/ Programming

Ocean County College
CSIT
Road to Success

Computer Design

Networking Design

Web Development

Artificial Intelligence

Database Development

CyberSecurity

Game Development

Business

A pathway to your brightest future

CENTER OF WORKFORCE INNOVATION FOR
Programming and Software Development

Veda Shamsid-Deen, Esq.

Director, Director for Technology & Innovation Sectors Strategy and Workforce Partnerships (NJCCC)

NJ PATHWAYS
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Aligning Education to Build an Innovative Workforce

PATHWAYS:

- ## Computer Science

- ## Computer Systems Technology

PATHWAY:
Computer Science

Connection to High School (Dual Enrollment)

Develop courses aligned to Java Programming, Oracle, Cisco and CompTIA industry credentials for all high schools.

PATHWAY:
Computer Science

Prior Learning Assessment (Other)

Evaluate non credit credentials (Java Programming, Oracle, Cisco and CompTIA) for credit and stackable into the Computer Science AS and AAS at Middlesex College and Essex County College.

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PATHWAY:
Computer Science

Connection to 4-Year Universities
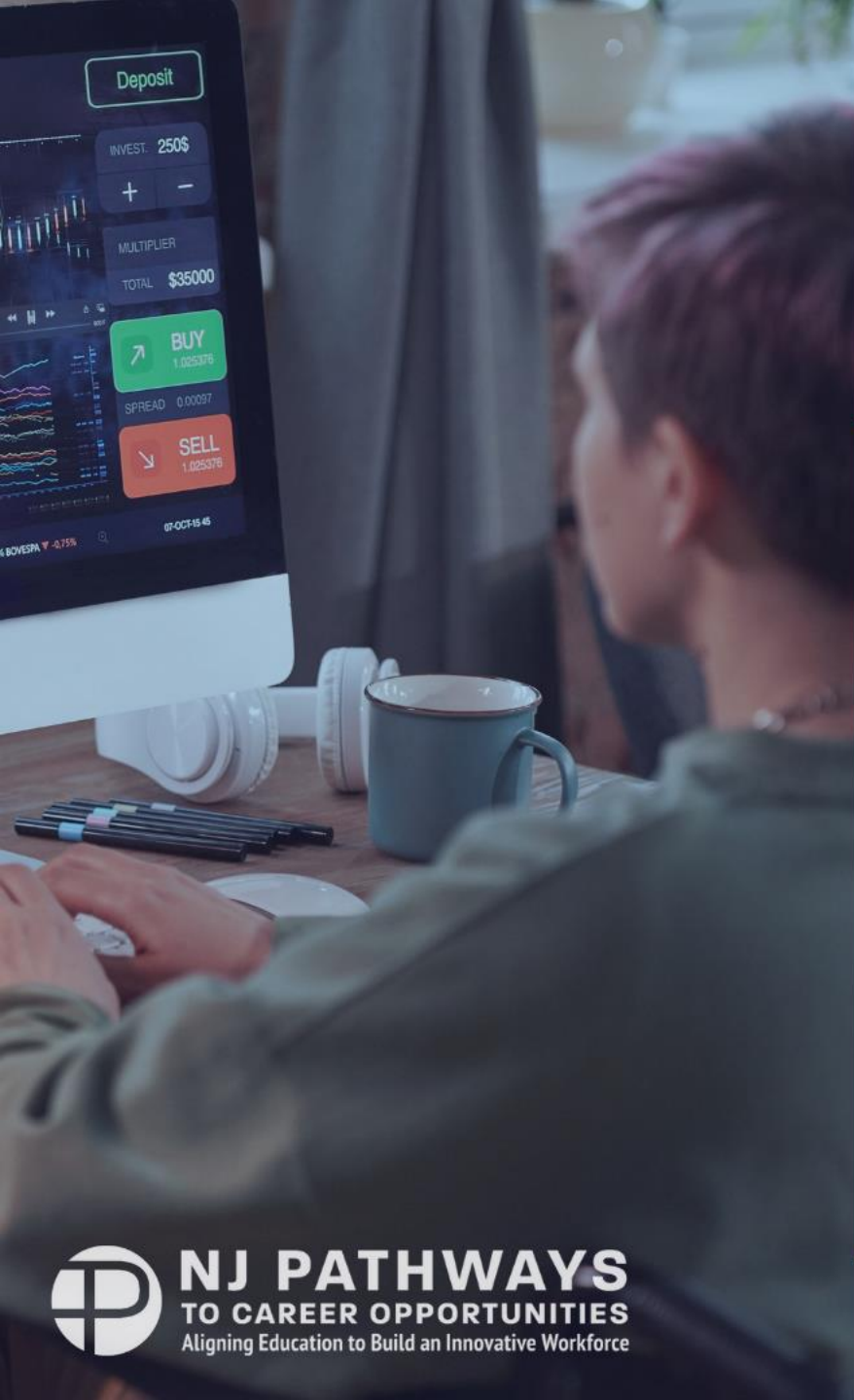
Create model 2+2 articulation agreement with Rowan University.

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PATHWAY:
Computer Science

Adult Learners

Develop non credit workforce program embedding industry credentials (Java Programming, Oracle, Cisco, and CompTIA).

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PATHWAY:
Computer Science

Professional Development

Create train-the-trainer resources, share it widely with other education institutions statewide, and deliver professional development on this Computer Science pathway.

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PATHWAY:
Computer Systems Technology

Connection to High School (Dual Enrollment)

Develop courses aligned to Cisco and CompTIA industry credentials for all high schools.

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PATHWAY:
Computer Systems Technology

Connection to Community College (Credit)

Map competencies and skills of four new courses to Cisco and CompTIA credentials.

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PATHWAY:
Computer Systems Technology

Prior Learning Assessment (Other)

Pilot cohort non credit workforce program embedding industry credentials (CompTIA A+, CompTIA IT Fundamentals, and CompTIA Network).

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PATHWAY:
Computer Systems Technology

Connection to 4-Year Universities

Create model 2+2 articulation agreement with Rowan University.

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PATHWAY:
Computer Systems Technology

Adult Learners

Develop non credit workforce program embedding industry credentials (CompTIA A+, CompTIA IT Fundamentals, and CompTIA Network).

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PATHWAY:
Computer Systems Technology

Professional Development

Create train-the-trainer resources, share it widely with other education institutions statewide, and deliver professional development on the Computer Science Technology pathway.

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GIVE US YOUR FEEDBACK

PROGRAMMING AND SOFTWARE DEVELOPMENT Industry Panel

Sam Caucci
Founder and CEO
(1Huddle)

Linda Wellbrock
VP, Community
Relations and Strategic
Partnerships (Fiserv)

Michelle Milentijevic
Head Talent
Acquisitions (Fiserv)

Michael Fanelli
Director (CGI)