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

SUMMIT 2025

# Innovate, Educate, Elevate: Pathways for All

Hard Rock Hotel & Casino Atlantic City **June 4, 2025**

NJPathways.org

# WELCOMING REMARKS

**Catherine Starghill, Esq.**

**Vice President,**
New Jersey Council of County Colleges

**Executive Director,**
New Jersey Community College Consortium for Workforce and Economic Development

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# WELCOMING REMARKS

**Elissa Frank**

**Vice President of Government Affairs,**
New Jersey Business and Industry Association

# NJ PATHWAYS
## TO CAREER OPPORTUNITIES
# SUMMIT
# 2025

**Innovate, Educate, Elevate:**
**Pathways for All**

# WELCOMING REMARKS

**Petra Gaskins**

**Chief of Staff,**

NJ State Senator Joseph Cryan,
NJ Senate Committee on Higher Education

# NJ PATHWAYS
## TO CAREER OPPORTUNITIES
# SUMMIT
# 2025

## Innovate, Educate, Elevate:
## Pathways for All

# WELCOMING REMARKS

**Jen Becker**

**Managing Director,**
New Jersey Economic Development Authority (NJEDA)

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

NJ PATHWAYS TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce
SUMMIT 2025

# PATHWAYS IN PRACTICE: STUDENT IMPACT & PROJECT INNOVATION

# Health Information Technology

**Dr. Elvy Vieira,**
**Bright Ubani,**
Essex County College

**Dana Castro,**
Healthcare Information and Management Systems Society

# Health Information Technology

**Education Partners:**

Essex County College

Brookdale Community College

Healthcare Information and Management Systems Society

**Brookdale Community College and Essex County College are partnering to expand industry certifications in New Jersey, offering HIMSS CAHIMS® certification training for adult learners entering the Health Information Technology workforce, as well as CPHIMS® certification for those already in allied health careers seeking to upskill.**

## EDUCATION PARTNERS:

Essex County College

Brookdale Community College

Healthcare Information and Management Systems Society

# Health Information Technology

**The capacity-building activities include:**

- Attending HIMSS Conferences to network, build partnerships, and promote the Health Information Technology (HIT) NJ Pathways project.
- Offering CAHIMS® and CPHIMS® courses, assisting with test enrollment, and reviewing the curriculum for alignment with existing HIT courses.
- Launching experiential learning through an AI hackathon.
- Hosting workshops and speaker series to explore career opportunities in health informatics.
- Expanding statewide capacity to teach CAHIMS®/CPHIMS® certifications, enhancing the pathway to career readiness in this in-demand field.

## PATHWAY CONNECTIONS:

**Connection to High School (Non-Credit)**

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Health Information Technology

## Pathway Connection Progress:

Essex County College (ECC) is leveraging its dual enrollment partnerships to develop a non-credit HIT pathway for high school students. This initiative aims to offer meaningful, real-world learning experiences and expose students to careers in health informatics. Students and instructional staff are invited to participate in HIT workshops, open houses, and the CAHIMS® certification course.

ECC will build instructional staff capacity by inviting them to attend the CAHIMS® course and provide pathway information to students through targeted outreach. ECC is also working with HIMSS to explore high school student participation in the Social Determinants of Health (SDOH) Hackathon.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

**PLA**

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Health Information Technology

## Pathway Connection Progress:

Essex County College's (ECC) Mathematics, Engineering Technologies, and Computer Sciences (METCS) Division is reviewing HIMSS CAHIMS® and CPHIMS® curricula for potential alignment with HIT 103: Introduction to Electronic Health Records. Students passing either certification may be eligible to receive 3 college credits.

## Challenges:

Finding a qualified subject matter expert to conduct the academic alignment review.

## Solutions:

ECC will work with HIMSS to identify credentialed experts through its industry network.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

**Experiential Learning**

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Health Information Technology

## Pathway Connection Progress:

**The Essex County College (ECC) team, BEND Connections, was the finalist in the 2025 NJ SDOH Hackathon, hosted by Cooper University Health System on February 28 in Camden. They presented at the HIMSS Global Conference in Las Vegas on March 4th, attracting two VC investors who expressed interest in possibly backing their solution.**


## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

**Pilot**

# Health Information Technology

## Pathway Connection Progress:

**Brookdale Community College and Essex County College, in collaboration with HIMSS, conducted two information sessions on February 24th (12:30 pm & 5:30 pm) to recruit for the CAHIMS® and CPHIMS® certification classes. Sessions were marketed widely across websites, flyers, posters, and social media. Student applications were reviewed and vetted with HIMSS input.**

## Program Details:

**Course Dates: March 20 – June 12**
**Format: Virtual, Thursday evenings, 6:00–7:30 p.m.**
**Exam Prep: June 17 – 26, Tuesdays and Thursdays, 6:00–8:00 p.m.**
**Total Enrolled: 57 students**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

**Pilot**

# Health Information Technology

**The spring HIT certification cohort includes:**

- **29 professionals from Hackensack Meridian Health, Virtua Health, Cooper Health, and Hunterdon Health**
- **9 students from Brookdale Community College**
- **19 students from Essex County College**

Hackensack Meridian *Health*

Hunterdon Health

Virtua Health

Cooper University Health Care

# NJ Big Data Alliance - Data Science Degree Alignment & Articulations

**Lori Dars,**
Rutgers, The State University of New Jersey

**Rut Mehta, Suhani Patel, Ananya Rayapuraju, Jessica Rippman, Shriya Singaraju,**
Master of Business and Science Externship Program

RUTGERS UNIVERSITY
Professional Science Master's Program
Master of Business and Science

Externship Exchange

# Pathways in Practice: Student Impact & Project Innovation

## NJ Big Data Alliance - Data Science Degree Program Alignment and Articulation

June 4, 2025
The Hard Rock Hotel & Casino
Atlantic City, New Jersey

# MBS-NJBDA-NJ Pathways Partnership

**This project is a partnership between**
Rutgers Masters in Business and Science Externship Program,
The New Jersey Big Data Alliance, and NJ Pathways

NJ BigData Alliance

NJ PATHWAYS

Research Project to Align Data Science Curriculum between
2-year and 4-year institutions in New Jersey

**Student Team Presentations:**

- ***Summer 2024*** - Prerequisite data science courses/outlines likely to transfer
- ***Fall 2024*** – Relevant courses for 1st two years of a data science-related degree likely to transfer, and model syllabi creation
- ***Spring 2025*** - Reviewing/reconciling existing data science, math and computer science courses at New Jersey 2-year and 4-year colleges

# //Data Science Curriculum Alignment Pathways Project//

Summer 2024

# //Meet the team

**Suhani Patel**

MBS, UXD
Team Lead

**Shriya Singaraju**

SEBS,
Biotechnology

**Saira Khan**

SAS, Data Science &
Computer Science

**Aryan Malik**

SAS, Math & Economics
& Computer Science

**Sara Shareef**

SAS, Computer
Science

## MBS ADVISORS

**Dr. Karen Bemis**

Assistant Director

**Lori Dars**

Senior Advisor

## PROGRAM MENTOR

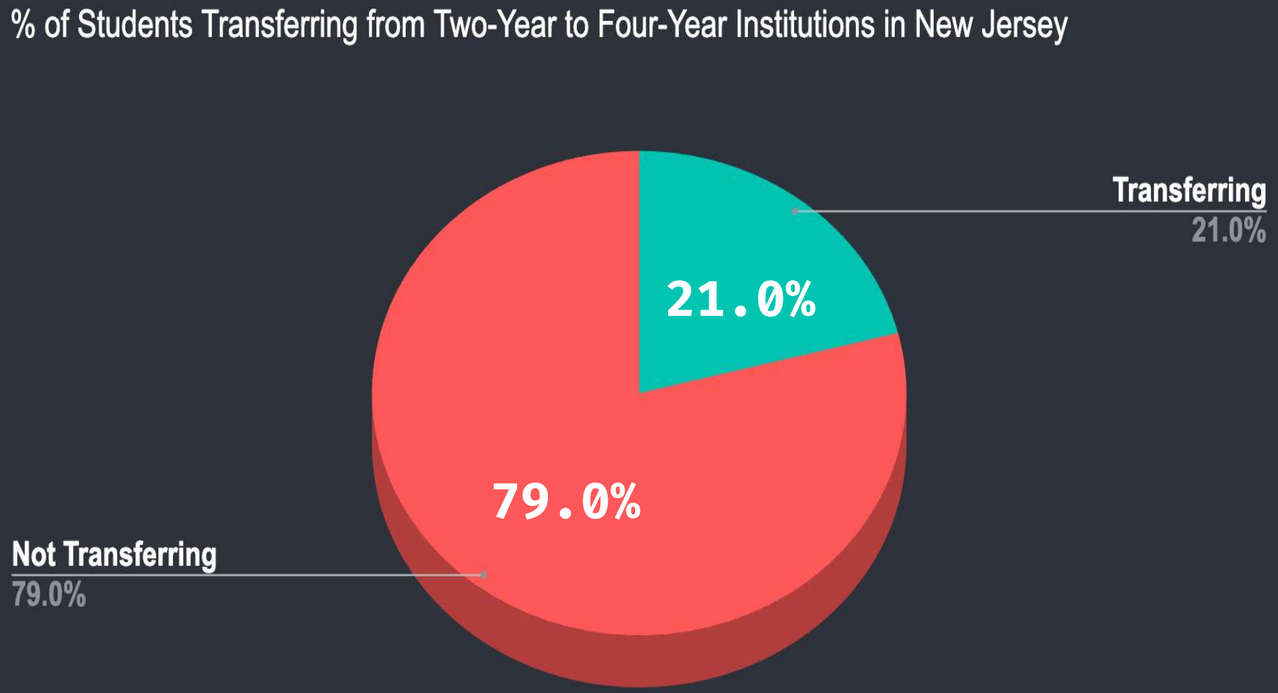
**Dr. George Avirappattu**

NJBDA/Kean University

# //Background

**18** Two-year colleges in NJ

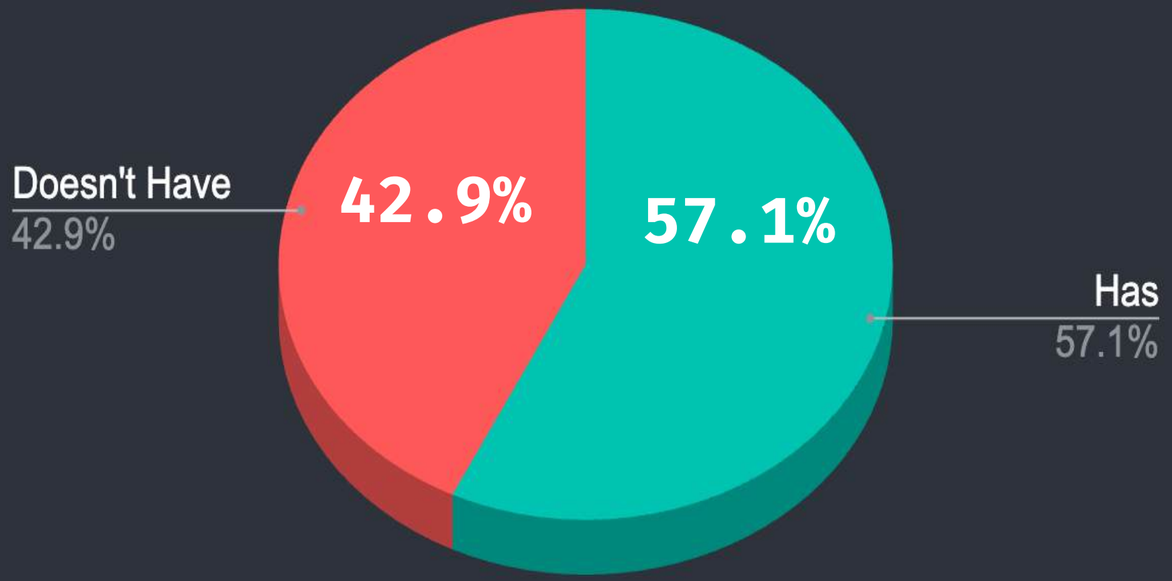
**23** Four-year colleges in NJ



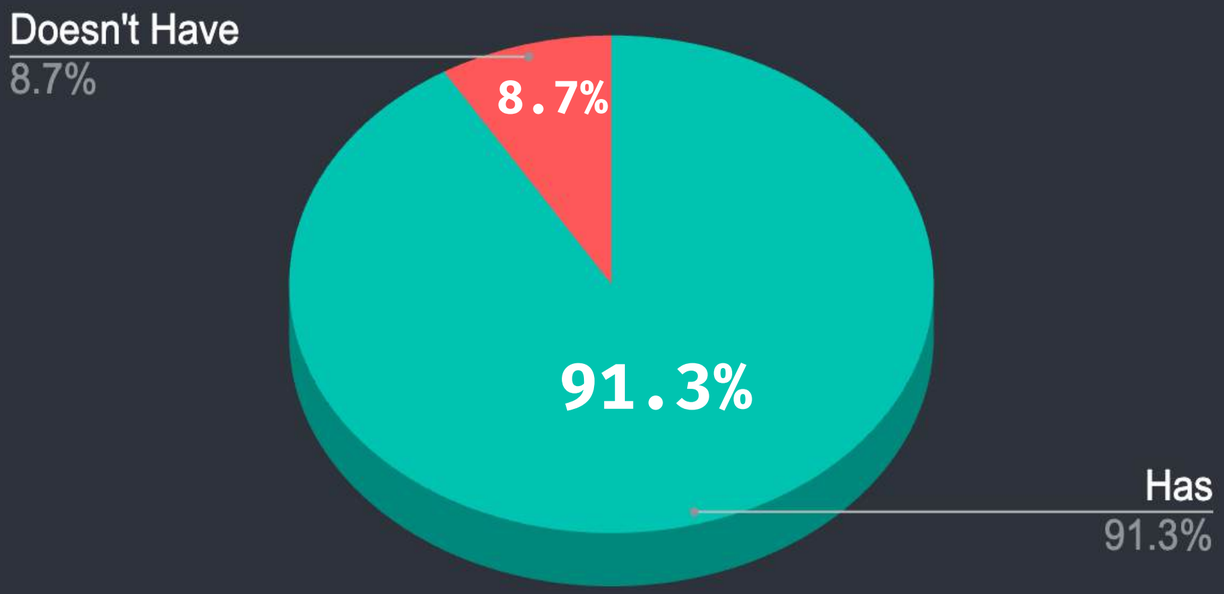

"NJBDA partnered with NJ Pathways on a "Data Science Curriculum Alignment and Articulation Agreement Pathways Project"

# //Background

## NJ Community Colleges Offering Data Science Programs*



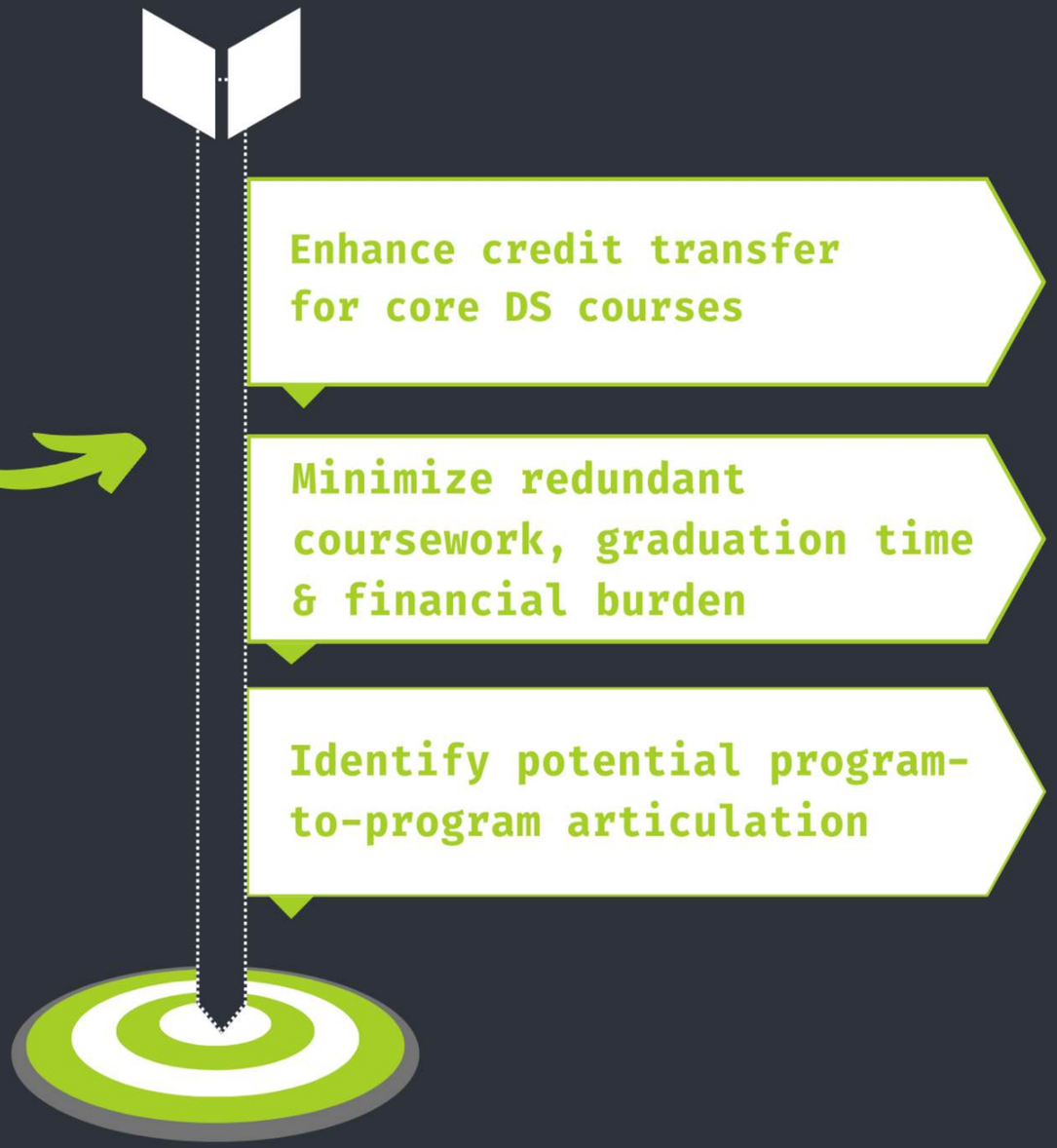

## NJ 4 Year Institutions Offering Data Science Programs




*as of Summer 2024

# //Problem Statement & Goal

{// Overcome inconsistencies and standardize the course content map to facilitate smoother credit transfers for NJ students between 2-Year and 4-Year institutions. //}



# //Project Approach

Mid June 2024 → Late June 2024 → Early July 2024 → Mid July 2024 → Late July 2024 → August 2024

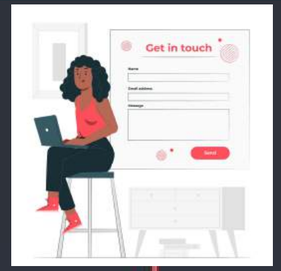
## Data Collection

Identify target institutions

Collect data (courses, curriculum)

## Sample Colleges

Rutgers
TCNJ
Ramapo
NJIT




## Outreach & Syllabus Collection

Contact for most updated syllabi

## Course Content Analysis

Pre-req and first level data science courses

Compare, Identify gaps

## Course Outline Development

Template creation

## Course Outline Finalization

Present findings, recommendations to stakeholders

# //Categorization of NJ 4-Year & 2-Year Colleges

| Sheet: Categorization of Community Colleges in New Jersey based on Data Science Course Information | | | | | | |
|---|---|---|---|---|---|---|
| Institution Name | Program URL(s) | Information Category | Notes | Categories | | |
| Atlantic Cape | https://catalog.atlanticcape.edu/computer-information-systems/computer-information-systems | Comprehensive | Very very nice to use. Has all courses labeled and laid out in both timelines and requirements. All links work and provide course descriptions and details | | Comprehensive Information | Detailed program requirements and course descrip available / syllabi |
| Brookdale | https://catalog.brookdalecc.edu/programs/MSDAT | Comprehensive | Has all requirements and prerequisites along with course descriptions and credit details | | Moderate Information | Some detailed information available, but missing specific course descriptions / syllabi |
| Essex | https://catalog.essex.edu/about-academic-divisions/math-engineering-technology-computer-science-division/computer-science-as/ | Moderate Information | Has all the course descriptions and general major requirments in one place, so its easy to locate. Not many data science courses, mainly programming. Also includes one course that could be transferrable | | Limited Information | Very limited information available, with many gaps course descriptions / syllabi |
| Hudson *Has CONNECT program | https://www.hccc.edu/programs-courses/academic-pathways/stem/computer-science-as-bs.html | Moderate Information | There is no data science program. But easy access to course descriptions, but not that clear and detailed descriptions. Some courses are related to data science though. provides the pre-reqs for the classes as well | | | |
| Camden | https://www.camdencc.edu/program/data-science/ | Limited Information | Curriculum plan available, lacks detailed information on courses offered | | | |
| Sussex | https://www.sussex.edu/academics/degrees/information-systems/ | Limited Information | No Data Scienc program impletemented. | | | |

# //Syllabi Outreach

***This sheet details the list of professors, deans, department heads, and other university administration who were contacted to provide syllabi information for the data science courses at their respective institutions. This sheet includes the contact name, their position, and their contact information, as well as the date they were contacted and notes about information received from them.

## Syllabi Contact Information and Status

| Institution contacted | Contact Name | Position | Contact Info | Date Contacted | Follow-Up Date | Status | Notes |
|---|---|---|---|---|---|---|---|
| Ramapo | **Amanda Beecher** | Associate Professor of Mathematics<br>Convener of Data Science<br>MS in Applied Mathematics<br>Program Director<br>Ramapo College of New Jersey | abeecher@ramapo.edu | 2024-06-24 | 2024-07-01 | Received | Received Syllabi from Prof Amanda |
| | **Sarah Stacey** | Admissions Counselor | admissions@ramapo.edu | | | | |
| | **Nora** | Transfer specialist | information@ramapo.edu | | | | |
| TCNJ | **Dr. Su VanderSandt** | Department Chair | email: mathstat@, P) 609.771.2269 | 2024-06-24 | 2024-07-01 | Pending | Contacted the department via phone; however, as of Friday, it seems they are on leave, and the call went straight to voicemail. |
| | **Dr. David Reimer** | Associate Department Chair | email: reimer@ | 2024-07-01 | | | |
| | **Dr. Cathy Liebars** | Mathematics Education Coordinator | email: liebars@ | 2024-07-01 | | | |
| | **Laurie Wanat** | Program Assistant | wanatl@ | 2024-07-01 | | | |
| | **Regina Littwin** | Department Secretary | littwin@ | 2024-07-01 | | | |

# //Selection of Sample Colleges

## 4-Year Institutions Studied

- NJIT
- Ramapo
- TCNJ
- Rutgers

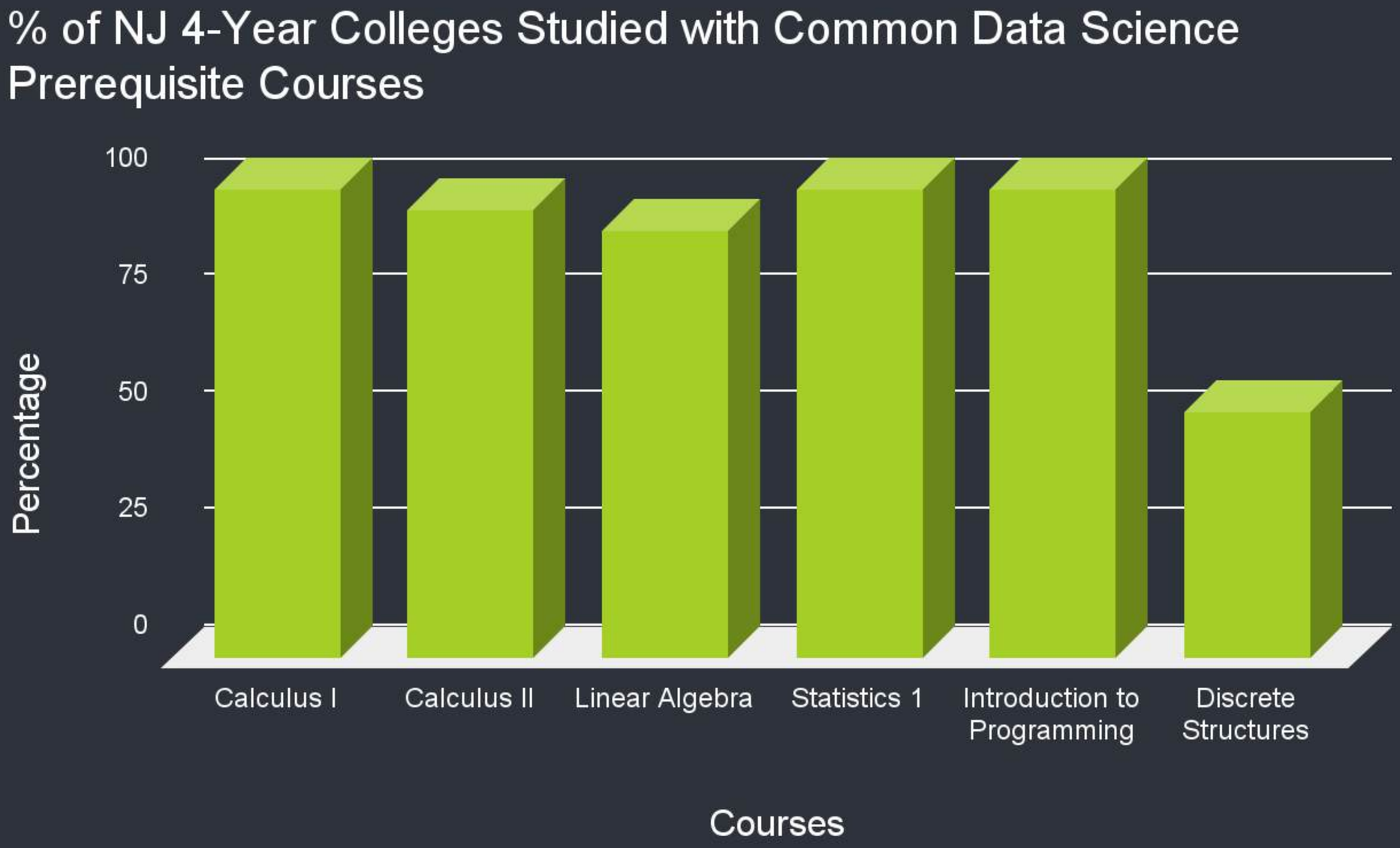
# //List of Pre-Reqs for 4-Year Institutions

***This sheet details the list of 1st and 2nd year courses offered by the mentioned colleges that correlate with math, statistics, and science.

## Required Correlate Courses

| College | Course Code | Course | Pre-req |
|---|---|---|---|
| NJIT | MATH 111 | Calculus I | University Mathematics B II - Trigonometry |
| | MATH 112 | Calculus II | Calculus I |
| | MATH 337 | Linear Algebra | Calculus II |
| | CS100 | Roadmap to Computing (Intro to Programming) | |
| | MATH 244 | Introduction to Probability Theory | Calculus II |
| RAMAPO | MATH 121 | Calculus I | Precalculus |
| | MATH 262 | Linear Algebra | Calculus I + Discrete Structures or Calculus I + Mathematical Structures |
| | MATH 237 | Discrete Structures | Calculus I |
| | MATH 205 | Mathematics Structures | Calculus I |
| TCNJ | MAT 127 | Calculus I | Precalculus |
| | MAT 128 | Calculus II | Calculus I |
| | MAT 205 | Linear Algebra | Calculus II OR Discrete Mathematics |
| | STA 215 | Statistical Inference and Probability | Calculus for Business and the Social Sciences OR Calculus I |
| | MAT 200 | Discrete Mathematics | Calculus I |
| | STA 305 | Regression Analysis | Statistical Inference and Probability |
| | STA 306 | Multivariable Statistics | Statistical Inference and Probability |
| | | Calculus I | |

# //Determination of Key Pre-Reqs



# //List of Required Introductory Data Science Courses at 4-Year colleges

***This sheet details the list of introductory courses required for a data science major from the four institutions selected for the pilot study: TCNJ, NJIT, Rutgers, Ramapo. The sheet includes the course code, course title, list of pre-requisites, and the university the course is offered at.

**Required CS Major / DS Specialization Introductory Core Courses**

| College | Course Code | Course | Pre-req |
|---|---|---|---|
| NJIT | CS 113 | Introduction to Computer Science | CS 100 Roadmap to Computing or CS 103. Computer Science with Business Problems |
| | CS 114 | Introduction to Computer Science II | CS 113 Introduction to Computer Science |
| | CS 241 | Foundations of Computer Science I | CS 114 Introduction to Computer Science II and MATH 112 Calculus II |
| RAMAPO | DATA 101 | Intro to Data Science | None |
| | CMPS 240 | Data Analytics In Python | CMPS 130 Intro to Programming in PYTHON OR CMPS 148 COMPUTER SCIENCE II |
| | DATA 301 | Data Analysis & Visualization | CMPS 240 Data Analytics In Python |
| TCNJ | CSC 220 | Computer Science I | None |
| | CSC 230 | Data Structures-Computer Science II | CSC 220 Computer Science I |
| | | Data management for Data Science | CS 142 (Data 101: Data Literacy) OR CS 111 (Introduction to Computer Science) |

# //Proposed List of Introductory Data Science Courses



1. Introduction to Data Science
2. Ethics in Technology
3. Data Analytics/Data Management using Python
4. Data Visualization

# //Course Content Compared Across Sample 4-Year Institutions

This sheet provides a comparative overview of the linear algebra topics covered across three universities: NJIT, Rutgers, and TCNJ. It lists specific topics in linear algebra and indicates their inclusion in the syllabi of each institution.

| Linear Algebra | | | |
|---|---|---|---|
| **Topics** | **NJIT** | **RUTGERS** | **TCNJ** |
| | School of Theoretical and Applied Science | School of Arts & Sciences | School of Science |
| | syllabi link | syllabi link | syllabi link |
| **Matrix Operations and Properties** | ☑ | ☑ | ☑ |
| Matrices | ☑ | ☑ | ☑ |
| Matrix Multiplication | ☑ | ☑ | ☑ |
| Matrix Algebra | ☑ | ☑ | ☑ |
| Invertibility | ☑ | ☑ | ☑ |
| Elementary Matrices | ☐ | ☑ | ☐ |
| Partitioned Matrices | ☐ | ☑ | ☐ |
| Inverse of a Matrix | ☑ | ☑ | ☑ |
| Block Multiplication | ☑ | ☑ | ☑ |
| LU Decomposition | ☑ | ☑ | ☑ |
| Systems of Equations | ☑ | ☑ | ☑ |
| **Systems of Equations** | ☑ | ☑ | ☑ |
| Homogeneous Systems | ☐ | ☑ | ☐ |
| Systems of Linear Equations | ☑ | ☑ | ☑ |
| Gaussian Elimination | ☑ | ☑ | ☑ |
| Reduced Row Echelon Form (RREF) | ☑ | ☑ | ☑ |
| Rank | ☑ | ☑ | ☑ |
| Nullity | ☑ | ☑ | ☑ |

**Courses include:**

- Linear Algebra
- Statistics I
- Discrete Structures
- Calculus I and II
- Introduction to Programming

# //Recommended Course Outlines

## INTRODUCTION TO PROGRAMMING

Semester Hours: Four (4) credits

Prerequisites: None

### Description

Introduces the fundamental concepts and software which are essential for theoretical computer science, and the role of programming in data science. Also introduces students to IDEs (e.g. Anaconda, Visual Studio Code) and setting up a programming environment. Topics include data types and expressions, debugging, functions and modules, file I/O, object-oriented programming, recursion, exceptions and assertions, collection data types, sorting algorithms, complexity analysis and counting operations, and searching.

### I. Course Objectives

Upon completion of this course, the student should be able to:

1. Understand and utilize fundamental data types and expressions..
2. Implement conditional statements and loops, including nested statements and loops.
3. Design and use functions and modules, including recursion functions.
4. Apply principles of object-oriented programming (OOP) and understand its benefits in data science.

### II. Course Content

#### Data Types and Expressions

- **Primitive Data Types**:
  - Integers, floats, strings, and booleans
- **Variable Declaration and Initialization**:
  - Naming conventions
  - Assignment operators
- **Expressions and Operators**:
  - Arithmetic, relational, and logical operators
  - Operator precedence and associativity

#### Debugging

- **Introduction to Debugging**:
  - Importance of debugging in programming
  - Common types of errors (syntax, runtime, logical)
- **Debugging Techniques**:
  - Using print statements
  - Using debugging tools in IDEs
- **Error Handling**:
  - Understanding and interpreting error messages

#### Decisions and Loops

- **Conditional Statements**:
  - If, else-if, else constructs

# //Next Steps

**3**

Step 03 — Expand analysis to all NJBDA member universities

**2**

Step 02 — Identify gaps between course outlines and community college syllabi

**1**

Step 01 — Develop Course Outline for Introductory Data Science Courses

## Introduction

**18** 2-year colleges in NJ

**23** 4-year colleges in NJ

NJBDA partnered with NJ Pathways on "Data Science Curriculum Alignment and Articulation Agreement Pathways Project"

## Problem Statement

Overcome inconsistencies and standardize the course content map to facilitate smoother credit transfers for NJ students between 2-Year and 4-Year institutions.

## Goals

Enhance credit transfer for core courses

Minimize redundant course work, financial burden & graduation time

## Results

- Categorization of NJ Colleges based on information available
- Pre-req Courses List for 4-Year colleges
- Introductory Data Science Courses at 4-Year colleges
- Course Content Comparison By Topic Across 4-Year Colleges

→

**Recommended Course Outline for Prerequisite Courses for 4-Year Colleges in NJ:**

- **Introduction to Probability & Statistics**
- **Calculus I**
- **Calculus II**
- **Linear Algebra**
- **Discrete Structures**
- **Introduction to Programming**

## Approach

## Key Learnings

Detailed documentation is essential for future reference.

Implementing through selected institutions helps refine the approach and ensures feasibility.

Effective collaboration with faculty is crucial for the standardization of core course requirements.

# THANK YOU!

# //Concept Map

2-Year Institutions

Document Available Courses

Collect Curricula & Align by content

Incorporate Data Science standards

Document Major/Core Requirements

4-Year Institutions

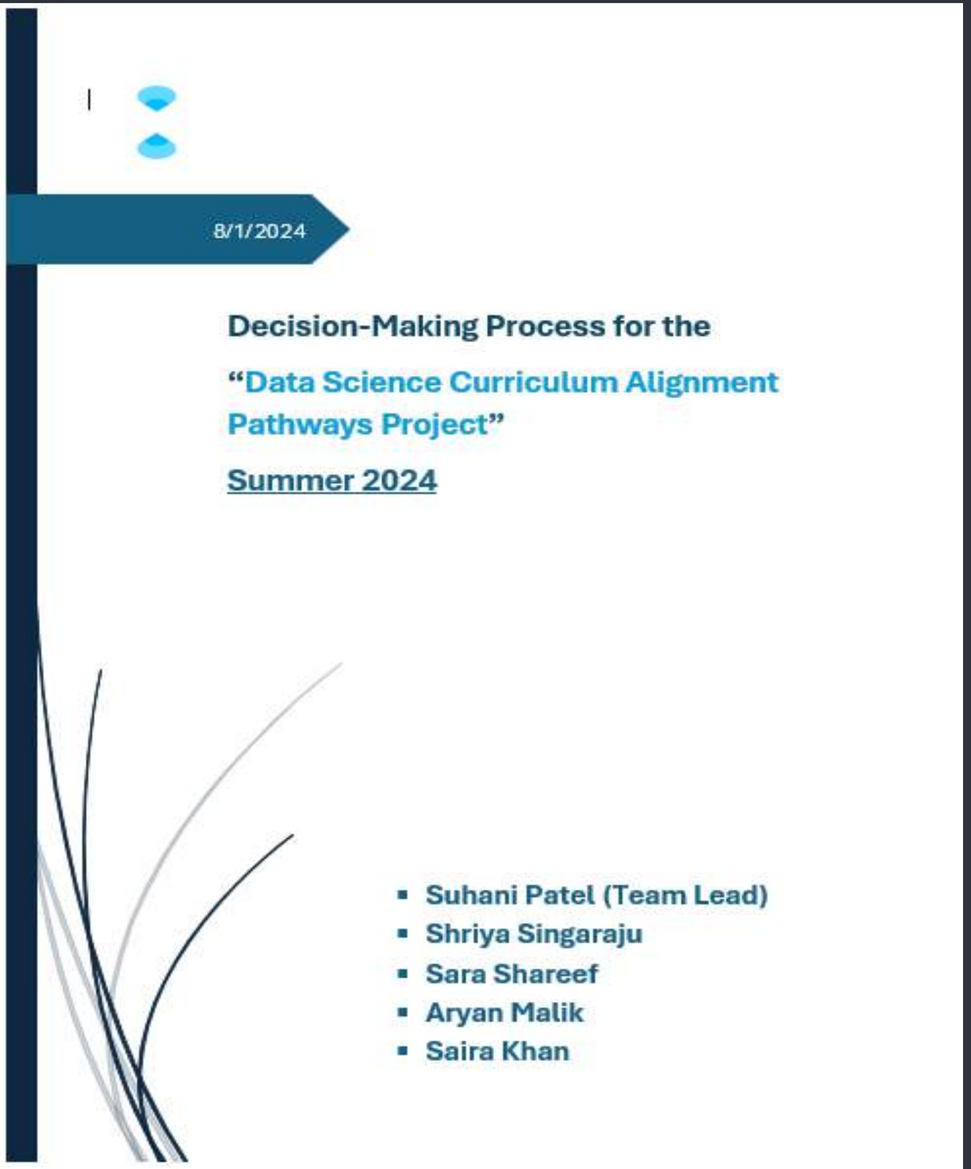

**Standardize Coursework:**

- Find common course content amongst 4 year institutions
- Develop pre-requisite course content outlines
- Establish agreed upon data science core course content

Recommend Articulations to NJBDA/Pathways

# //Decision Making Process White Paper

{// To enhance the project impact, analyze course offerings at two-year colleges to identify curriculum gaps and opportunities to improve transferability.//}



# //Course Content Compared Across Sample 4-Year Institutions

*Description: This sheet provides a comprehensive list of topics covered in Introduction to Programming across three selected four-year institutions. It includes the links to detailed syllabi and indicates which institution teaches each topic.

| INTRO TO PROGRAMMING | | | |
|---|---|---|---|
| **Topics** | **RAMAPO*** | **RUTGERS** | **NJIT** |
| | School of Theoretical and Applied Science | School of Arts & Sciences | Ying Wu College of Computing |
| | syllabi link | syllabi link | syllabi link |
| **Introduction to programming** | ☑ | ☑ | ☑ |
| Overview of Programming | ☐ | ☐ | ☐ |
| Programming Environment | ☐ | ☐ | ☐ |
| **Data Types and Expressions** | ☑ | ☑ | ☑ |
| Primitive Data Types | ☐ | ☐ | ☐ |
| Variable Declaration and Initialization | ☐ | ☐ | ☐ |
| Expressions and Operators | ☐ | ☐ | ☐ |
| **Debugging** | ☑ | ☑ | ☑ |
| Introduction to Debugging | ☐ | ☐ | ☐ |
| Debugging Techniques | ☐ | ☐ | ☐ |
| Error Handling | ☐ | ☐ | ☐ |
| **Decisions and Loops** | ☑ | ☑ | ☑ |
| Conditional Statements | ☐ | ☐ | ☐ |
| Loops | ☐ | ☐ | ☐ |
| Control Flow | ☐ | ☐ | ☐ |
| **Functions and Modules** | ☑ | ☑ | ☑ |
| Functions | ☐ | ☐ | ☐ |
| Modules | ☐ | ☐ | ☐ |
| Recursion | ☐ | ☐ | ☐ |
| **File I/O** | ☐ | ☑ | ☑ |
| Reading and Writing Files | ☐ | ☐ | ☐ |
| File Handling Exceptions | ☐ | ☐ | ☐ |

# //Course Content Compared Across Sample 4-Year Institutions

"" This sheet provides a standardized comparison of the syllabi for the Discrete Structures course across colleges. The format is designed to list the topics covered that are common to all colleges offering the course, followed by topics unique to each college.

| DISCRETE STRUTURES | | | |
|---|---|---|---|
| **Topics** | **RAMAPO** | **RUTGERS** | **TCNJ** |
| | School of Theoretical and Applied Science | School of Arts & Sciences | School of Science |
| | syllabi link | syllabi link | syllabi link |
| **Modeling Computation** | ☐ | ☑ | ☐ |
| Languages and Grammar | ☐ | ☑ | ☐ |
| Finite State Machines | ☐ | ☑ | ☐ |
| Turing machines* | ☐ | ☑ | ☐ |
| **Boolean Functions** | ☐ | ☑ | ☐ |
| Representations | ☐ | ☑ | ☐ |
| Logic Gates* | ☐ | ☑ | ☐ |
| Minimization of circuits* | ☐ | ☑ | ☐ |
| Probability | ☑ | ☐ | ☐ |
| Summations | ☐ | ☑ | ☐ |
| Truth Tables | ☐ | ☑ | ☑ |
| Intro to Graph Theory | ☐ | ☐ | ☑ |
| Mathematical notation | ☐ | ☐ | ☑ |

# //Course Content Compared Across Sample 4-Year Institutions

*Description: This sheet provides a comprehensive list of topics covered in Intro Statistics across three selected four-year institutions. It includes the links to detailed syllabi and indicates which institution teaches each topic. Only NJIT and TCNJ require this.

| Intro to Statistics | | |
|---|---|---|
| **Topics** | **NJIT** | **TCNJ** |
| | Ying Wu College of Computing | Department of Mathematics and Statistics |
| | syllabi link | syllabi link |
| Sample Space, Events | ☑ | ☑ |
| Counting | ☑ | ☐ |
| Probability | ☑ | ☑ |
| Conditional Probability | ☑ | ☐ |
| Independence | ☑ | ☑ |
| Arithmetic Rules of Probabilities | ☑ | ☐ |
| Bayes Rule | ☑ | ☐ |
| Random Variable | ☑ | ☐ |
| Discrete Probability Distribution | ☑ | ☐ |
| Continuous Probability Distribution | ☑ | ☐ |
| Joint Probability Distribution | ☑ | ☐ |
| Mean and Variance | ☑ | ☑ |
| Binomial Distribution | ☑ | ☐ |
| Hypergeometric Distribution | ☑ | ☐ |
| Possion Distribution | ☑ | ☐ |
| Continuous Uniform Distribution | ☑ | ☐ |
| Normal Distribution | ☑ | ☑ |
| Normal Approximation of Distributions | ☑ | ☑ |
| Gamma Distribution | ☑ | ☐ |
| Exponential Distribution | ☑ | ☐ |
| Transformations of Distributions | ☑ | ☐ |
| Moment Generating Functions | ☑ | ☐ |

# //Course Content Compared Across Sample 4-Year Institutions

*Description: This sheet provides a comprehensive list of topics covered in Calculus 2 across three selected four-year institutions. It includes the links to detailed syllabi and indicates which institution teaches each topic. Ramapo was not included as it does not require calculus 2.

| Calculus II | | | |
|---|---|---|---|
| **Topics** | **RUTGERS** | **NJIT** | **TCNJ** |
| | School of Arts & Sciences | Ying Wu College of Computing | Department of Mathematics and Statistics |
| | syllabi link | syllabi link | syllabi link |
| Definite Integrals | ☑ | ☑ | ☑ |
| Indefinite Integrals | ☑ | ☑ | ☑ |
| Area Between Curves | ☑ | ☑ | ☑ |
| Volume - Cross Sections | ☑ | ☑ | ☑ |
| Volume - Shell Method | ☑ | ☑ | ☑ |
| Arc Length | ☑ | ☑ | ☑ |
| Integration by Parts | ☑ | ☑ | ☑ |
| Trig Integrals | ☑ | ☑ | ☑ |
| Trig Substitutions/Equivilancies | ☑ | ☑ | ☑ |
| Improper Integrals | ☑ | ☑ | ☑ |
| Series and Sequences | ☑ | ☑ | ☑ |
| Infinite Series | ☑ | ☑ | ☑ |
| Series Tests | ☑ | ☑ | ☑ |
| Taylor Series | ☑ | ☑ | ☑ |
| Maclaurin Series | ☑ | ☑ | ☑ |
| Taylor Expansion/Convergence | ☑ | ☑ | ☑ |
| Polar Coordinates | ☑ | ☑ | ☑ |
| Calculus in Polar | ☑ | ☑ | ☑ |
| Parametric Equations | ☑ | ☑ | ☑ |
| Complex Numbers | ☑ | ☐ | ☐ |
| Complex Arithmetic | ☑ | ☐ | ☐ |
| Eulers Notation | ☑ | ☐ | ☐ |
| Complex Numbers in Polar Coordinates | ☑ | ☐ | ☐ |
| Roots of Complex Numbers | ☑ | ☐ | ☐ |
| Intro to Differential Equations | ☑ | ☐ | ☐ |

# //Key Learnings

Enhanced skills in analyzing and interpreting large datasets.

– **Sara**

Learned to collaborate effectively with peers from diverse academic backgrounds

– **Saira**

Informative visual representation of large raw data sets.

– **Suhani**

Gained insight into the institutional transfer process

– **Shriya**

Developed skills for collecting large data quickly (and dealing with its struggles)

– **Aryan**


# Fall 2024 - Data Science Curriculum Alignment Project
# NJBDA and NJ Pathways

## Streamlining credit transfers for degrees in data science

# Meet The Team

**Jessica Rippman - Team Lead**

B.A. Mathematics (Statistics) @ Rowan University

**Simra Ahmed**

B.S. Computer Science @ Ramapo College

**Rebecca Feit**

B.S. Computer Science @ Ramapo College

**Pranjal Karanjkar**

B.S. Business Analytics @ Rutgers University

**Aliaksandra Voitsik**

B.S. Mathematics (Data Analytics) @ Kean University

## RUTGERS MBS ADVISORS

**Dr. Karen Bemis**
**Assistant Director**

**Lori Dars**
**Senior Advisor**

## MENTOR

**George Avirapattu**
**Faculty, Kean University**

# Project Approach

## Step 1


Identify NJ institutions with most transfer students and US schools with top data science programs.

## Step 2

Select a sample of schools to research.

## Step 3

Identify requirements for the first 2 years of a degree in data science.

## Step 4

Organize course requirements for each school into a spreadsheet

## Step 5

Collect and analyze the syllabi for similar learning objectives.

## Step 6

Construct course outlines and create a 2-year roadmap.

# School Selection Process

## The Integrated Postsecondary Education Data System

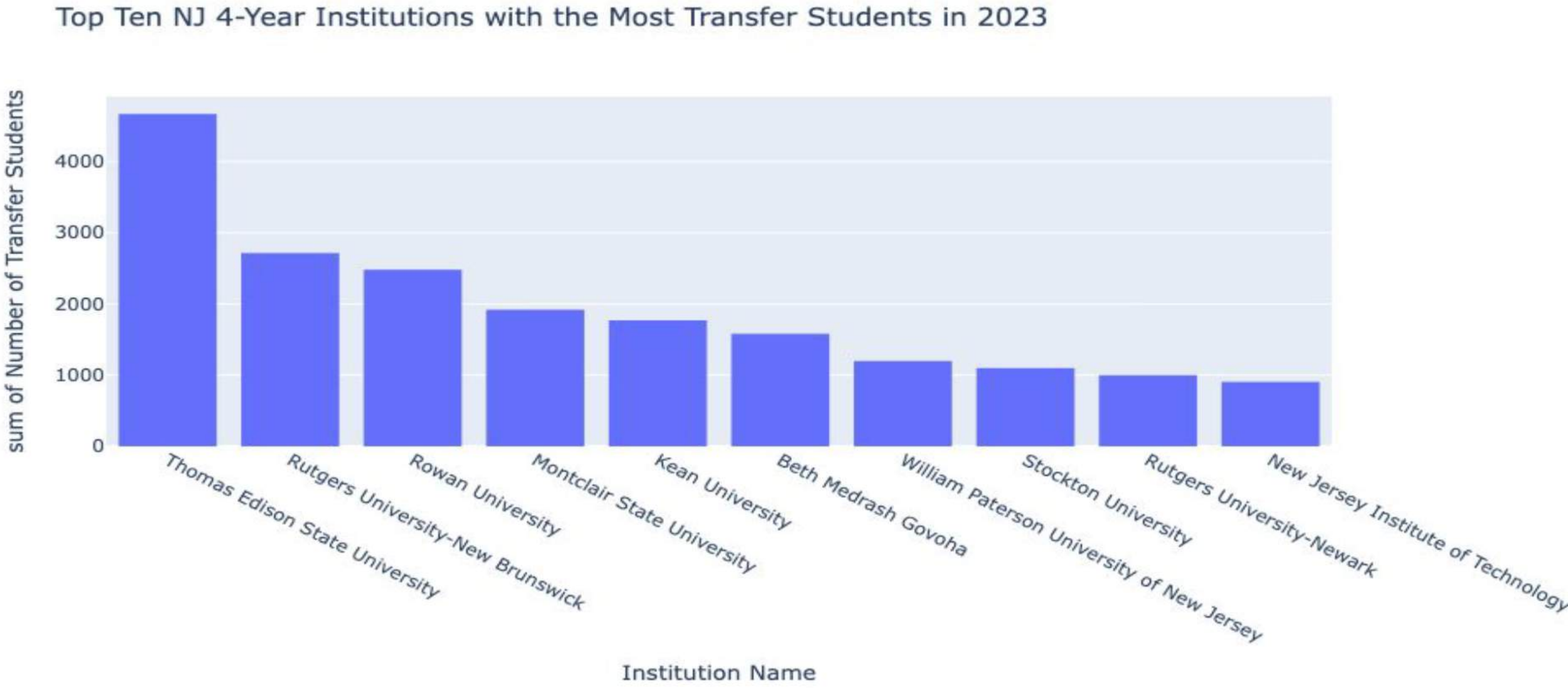
IPEDS Integrated Postsecondary Education Data System

### What is IPEDS?

- A comprehensive **data collection system** managed by the National Center for Education Statistics (NCES)
- **Gathers information** from all U.S. colleges, universities, and technical/vocational institutions that participate in federal student financial aid programs
- **Collects data** on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid

Link to the Integrated Postsecondary Education Data System:
https://nces.ed.gov/ipeds/use-the-data

# School Selection Process



# School Selection Process

**Expanding Our Research Scope**

**Initial NJ Focus:** Rowan, Rutgers, Montclair, and Kean

**Added 10 "Gold-Standard" Data Science Programs:**

- In-state: NJIT, Ramapo College, St. Peter's University
- National leaders: Purdue, Michigan, UC Berkeley, UPenn, Northwestern, NYU, Carnegie Mellon


**Selection Process:** Based on US News "2025 Best Undergraduate Data Science Programs" rankings and mentor recommendations

Link to article:

https://www.usnews.com/best-colleges/rankings/computer-science/data-analytics-science?_sort=rank&_sortDirection=asc

# Action: Obtaining Syllabi

## Step 1

Search for recommended 4-year roadmaps for each university online.

## Step 2

Determine required Data Science/Math courses within first two years.

## Step 3

Enter course information into spreadsheet & determine courses to analyze.

## Step 4

Email school advisors/professors to obtain syllabi.

# First Two Years of Data Science Courses by School

| Insitution | Course Code | Course Name | Prerequisite courses | Credits | Notes | Recommended Semester |
|---|---|---|---|---|---|---|
| Montclair State University | CSIT 104 | Python Programming I | None | 3 | Introduction to basic computational concepts; legal and ethical issues in computing and information technology. Main | 1st |
| | CSIT 114 | Python Programming II | CSIT 104 Python Programming I | 3 | This is an intermediate-level Python programming course. It is a continuation of CSIT 104. It will cover topics such as | 2nd |
| | CSIT 213 | Data Structures and Algorithms in Python | CSIT 114 Python Programming II | 3 | This course will teach the creation and manipulation of in-memory data structures including lists, queues, trees, stacks, heaps | 3rd |
| | CSIT 230 | Computer Systems | CSIT 111 Fundamentals of Java Programming **OR** CSIT 114 Python Programming II **AND** CSIT 170 Discrete Mathematics; MATH 122 Calculus I **OR** AMAT 120 Applied | 3 | This course aims to introduce the fundamental aspects of computer systems from the hardware and software point of | 4th |
| | CSIT 359 | Data Visualization | CSIT 213 Data Structures and Algorithms in Python | 3 | This course provides fundamental exploratory techniques to summarize and visualize data sets. R and Python | 4th |
| Kean University | CPS 2231 | Computer Programming | CPS 1231 and Math 1054 | 4 | Fundamental computing and programming concerts; use of systems software; problem solving; design of algorithms using a | Freshmen, 1st |
| | CPS 2232 | Data Structures | CPS 2231 and MATH 2110 | 4 | The course covers the theory of Abstract Data Types (ADTs), applications and implementations of the classical ADTs | Freshmen, 2nd |
| | CPS 2390 | Computer Organization and Architecture | CPS 2231 and MATH 2110 | 3 | Fundamental concepts of Instruction Set Architecture (ISA) and Assembly Language | Sophomore, 3rd |
| | CPS 3250 | Computer Operating Systems | CPS 2232 and CPS 2390 | 3 | Concepts, structure and mechanisms of operating systems, types of operating systems, CPU scheduling, memory | Sophomore, 4th |

# Splitting up Core Courses

| Required Core Courses (math/science/statistics) |
|---|

- Classes that were math-focused
  - Already completed by previous group, so we did not focus on these.

| Required CS Major / DS Specialization Introductory Core Courses |
|---|

- Classes focused on core Data Science and/or Computer Science principles
  - Focused on these for our analysis to efficiently continue research.

# Compiling Common Courses

| |
|---|
| “Introduction to Programming” Courses (10/10 schools) |
| “Data Structures” Courses (8/10 schools) |
| “Introduction to Data Science” Courses (10/10 schools) |
| “Statistics/Probability for Data Science” Courses (10/10 schools) |
| “Ethics for Technology/Data Science” Courses (7/10 schools) |

- Later decided to include “Data Visualization”
  - Course can be taught at a low-level without many prerequisites.

- Using these common courses as a base, we then looked for syllabi at each school for these courses.

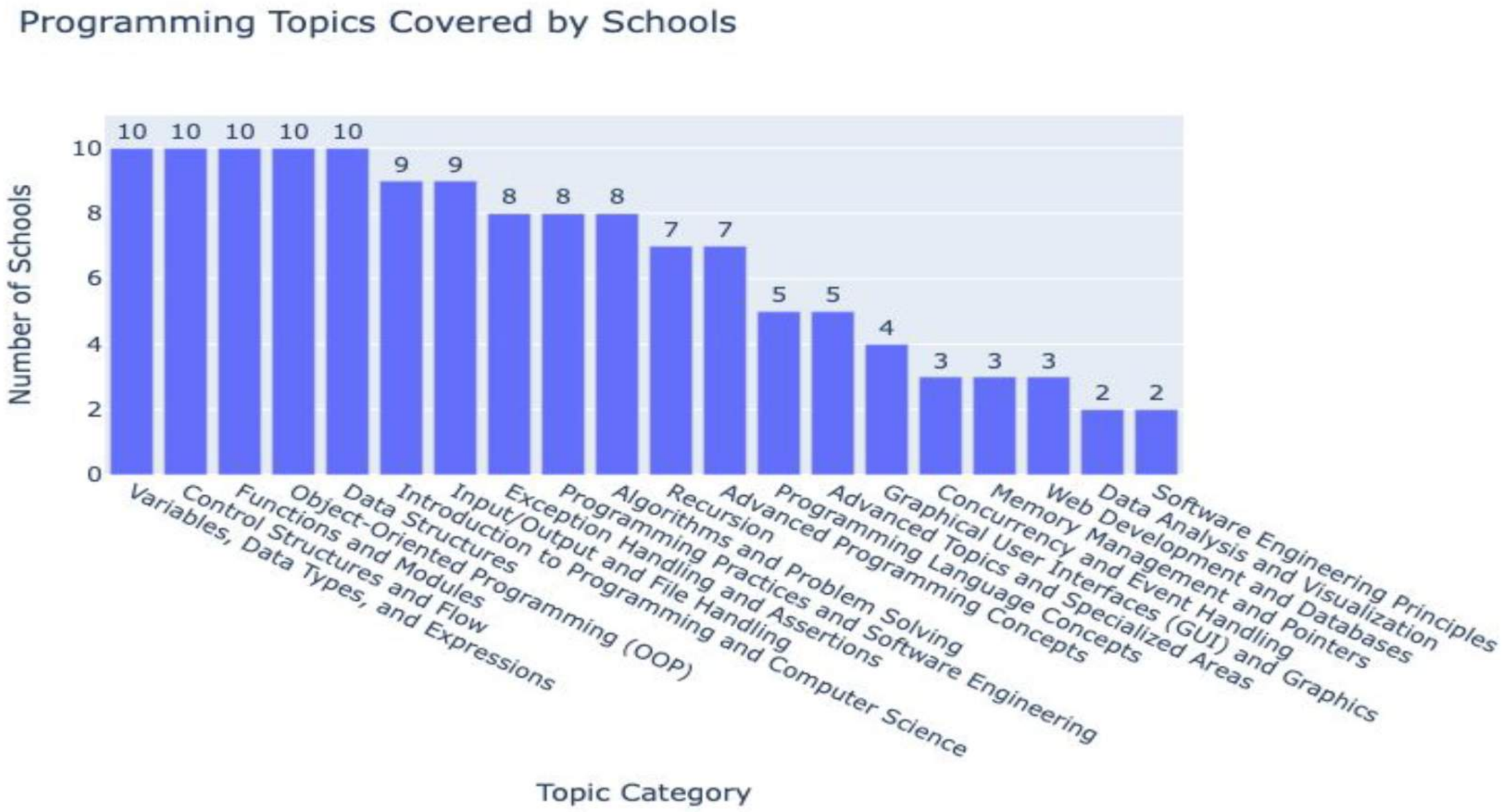
# Data Structures Checklist Ex.

NJ PATHWAYS
Aligning Education to Build an Innovative Workforce

NJBigData Alliance

| Topic | Berkeley | NYU | Rutgers | Michigan | Kean | Ramapo |
|---|---|---|---|---|---|---|
| **Introduction to Data Structures** | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| **Object-Oriented Principles** | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| **File I/O** | | ☑ | | ☑ | | ☑ |
| **Exception Handling** | | ☑ | | ☑ | | |
| **Recursion** | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| **Lists** | ☑ | ☑ | | ☑ | ☑ | ☑ |
| - Array-based List | ☑ | ☑ | | ☑ | ☑ | ☑ |
| - Linked List (Singly) | ☑ | ☑ | | ☑ | ☑ | ☑ |
| - Doubly Linked List | ☑ | ☑ | | | | |

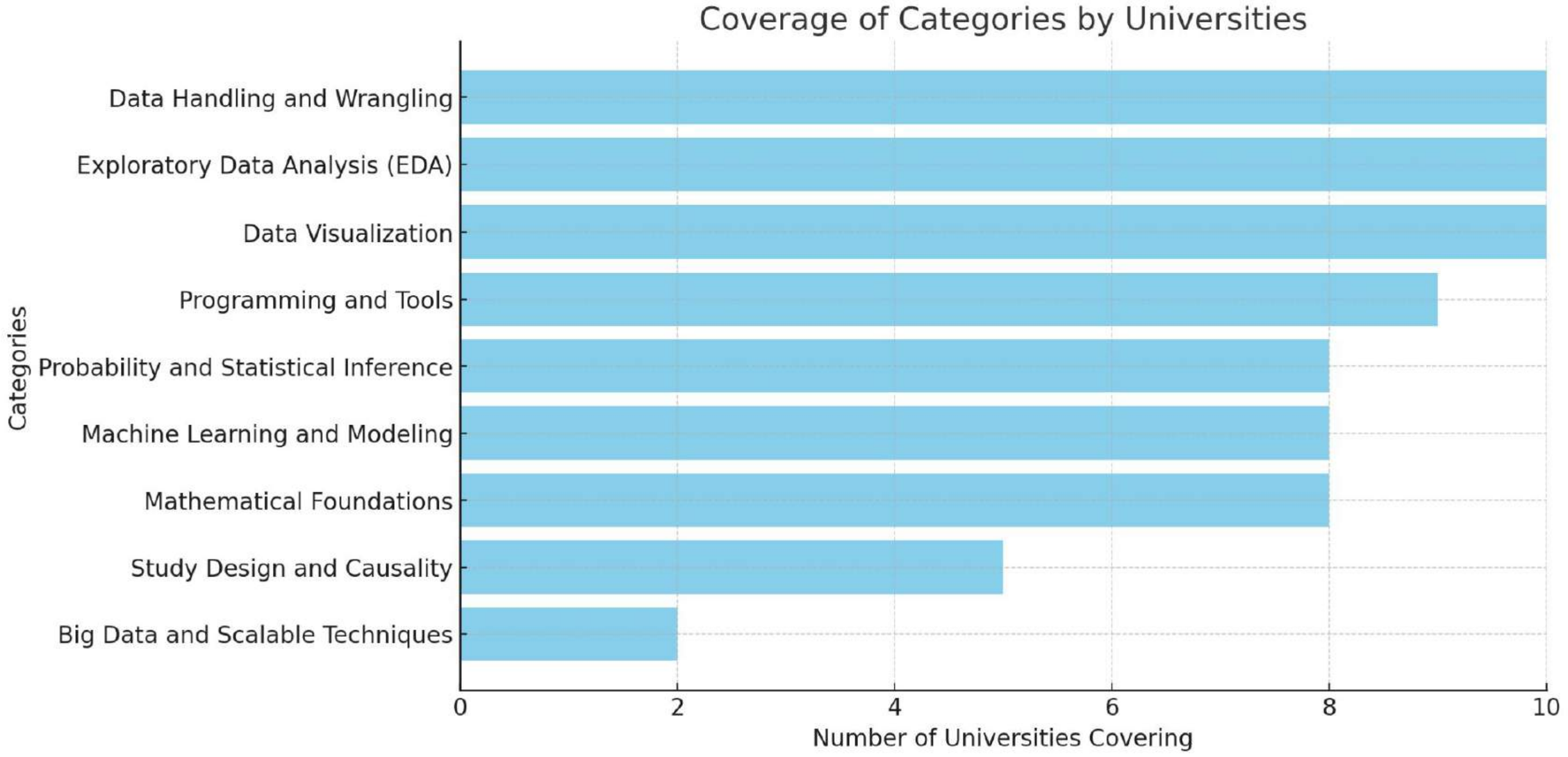
# Programming Topics



# Introduction to Data Science

NJ PATHWAYS
Aligning Education to Build an Innovative Workforce

NJBigData Alliance



# Course Outlines & Roadmap

- Introduction to Data Science
- Statistics/Probability for Data Science
- Introduction to Programming in Python
- Data Structures
- Data Visualization
- Ethics for Data Science/AI

# Course Outlines - Results

Recommended course outline

## DATA VISUALIZATION

Semester Hours: 3 credits

Prerequisites: Introduction to Data Science and Introduction to Python Programming

### Description

This course introduces students to the fundamental principles, tools, and techniques of data visualization. It emphasizes the role of visualization in exploring data, communicating insights, and making data-driven decisions. Topics include design principles, perception and cognition, advanced visualization techniques, interactive dashboards, and storytelling with data. Students will gain hands-on experience with popular visualization tools and programming libraries, creating meaningful visualizations tailored to specific audiences and contexts.

### I. Course Objectives

1. Utilize a variety of tools and programming libraries to create effective data visualizations.
2. Apply design principles and an understanding of perception and cognition to visualization design.

# Course Outlines - Results

Recommended course outline

## Introduction to Data Visualization

- Definition and Purpose
  - What is data visualization?
  - Importance in data analysis and communication
- Historical Evolution of Data Visualization
- Types of Data and Visualizations
  - Quantitative vs. categorical data
  - Matching data types to appropriate visualizations

## Visualization Tools and Software

- Overview of Popular Tools:
  - Tableau: Basic usage and advanced features (e.g., filters, dashboards)
  - R (ggplot2, Shiny): Creating and customizing visualizations
  - Python (Matplotlib, Seaborn, Plotly): Static and interactive visualizations
- Comparative Analysis of Tools:
  - Strengths and limitations of different platforms
- Hands-on Practice with Selected Tools

## Design Principles and Perception

- Core Design Principles:
  - Clarity, simplicity, and accessibili
  - Gestalt principles of visual organizati
- Visual Perception and Encoding:
  - How users perceive visual elements like color and size
  - Effective use of visual channels (position, color, shape)
- Aesthetics and Accessibility:
  - Color theory and palettes
  - Designing for diverse audiences (e.g., colorblind users)

# Roadmap - Results

Should Intro to Python be a 1 or 2 credit class?

## Freshman Year (18 Credits)

| Semester | Course Name | Credits |
|---|---|---|
| **Semester 1** | Calculus I | 4 |
| | Intro to Programming (Python) | 4 |
| **Total Credits** | | **8** |
| **Semester 2** | Calculus II | 4 |
| | Intro to Data Science | 3 |
| | Intro to Programming (Java or C++) | 3 |
| **Total Credits** | | **10** |

Is another programming language class necessary?

# Roadmap - Results

## Sophomore Year (17 Credits)

| Semester | Course Name | Credits |
|---|---|---|
| **Semester 3** | Data Structures | 4 |
| | Linear Algebra OR Discrete Math | 3 |
| | Statistics/Probability for Data Science | 4 |
| **Total Credits** | | **11** |
| **Semester 4** | Data Visualization | 3 |
| | Data Ethics | 3 |
| **Total Credits** | | **6** |

# Project Insights

- Core data science courses often differ in topics and learning outcomes.
- A standardized curriculum would set clear benchmarks, reducing learning gaps and redundancies.
- Standardization will help students retain credits and save time when moving between institutions.

# Data Science Curriculum Alignment Project

## Introduction

NJBDA partnered with NJ Pathways on “Data Science Curriculum Alignment and Articulation Agreement Pathways Project”.

## Problem Statement

1. Transfer credit issues
2. Cost and time delays
3. Career uncertainty

## Goals

## Results

Recommended Courses:

- Introduction to Programming in Python
- Statistics/Probability for Data Science
- Ethics for Data Science / AI
- Data Visualization
- Introduction to Data Science
- Data Structures

## Approach

Collect syllabi from 4-year institutions and gold standard schools.

↓

Analyze collected syllabi to identify overlaps and gaps within core Data

## Key Learnings

- Core data science courses often differ in topics and learning outcomes.

- A standardized curriculum would set clear benchmarks, reducing learning gaps and redundancies

# THANK YOU!

# NJBDA and NJ Pathways Data Science Curriculum Alignment and Articulation Agreement Project - Spring 2025

# Meet The Team

**Ananya Rayapuraju**
Business Analytics & IT
Rutgers University

**David Lopez**
Data Science
Ramapo College

**Muhammad Zohab**
Computer Science
Saint Peter's University

**Rut Mehta**
B.S. in Business Analytics & IT, Computer Science
Rutgers University

**Thomas Ampadu**
B.S in Computer Science
NJIT

## RUTGERS MBS ADVISORS

**Karen Bemis**
Associate Director, MBS Externship

**Lori Dars**
Senior Advisor, MBS Externship

## PROGRAM MENTOR

**George Avirappattu**
Professor of Mathematics,
Kean University

## COMMUNITY COLLEGE ADVISOR

**Nick Picioccio**
Professor of Computer Science,
Middlesex College

# Problem Statement / Goals

## Problem Statement

Community college students in New Jersey often face barriers when transferring Data Science-related credits to four-year institutions

## Goals

Identify insights and possible trends for classes not transferring between 2-year colleges and 4-year institutions

Develop course recommendations for colleges to consider and implement for improved Data Science course equivalency

# What is NJ Transfer?

- Primary background research for our team was extracting qualitative information about the workings of NJ Transfer from Thea Olsen: Executive Director, New Jersey Statewide Transfer Initiative

## How does NJ Transfer work?

**Course Created at CC**

01

When a course is **created**, and added to the NJ Transfer website/bank, the NJ Transfer system **pings** the administrator at 4-year universities to determine **course equivalencie**s in their institution. They send it back.

**Course equiv matrix**

02

NJ Transfer builds a **course equivalency database**, storing equivalencies from **every CC to each participating university**.

**Transfer Program Search**

03

At the start of each year (ideally), the 4 year university sends an **Recommended Transfer Program (RTP)**. Using the database, NJ Transfer **back searches** to fill in all of the requirements of the program.

**Manual updates**

04

If there is a change in equivalency, the NJ Transfer team will need to **manually update** records. Furthermore, if a 4 year university creates a **new course** that is equivalent to a CC course, that also has to be done manually

# Approach

To **increase the transferability** of data science courses/curriculums from NJ community colleges to four-year institutions

Gathering Data Science/Math/CS **Syllabi and Curriculums**

Perform **manual analysis** (excel) for detailed understanding of data, structure, insights

Perform **automated analysis (python)** for speed and high volume processing to extract global insights

**Combine** both analysis streams to create **recommendations**

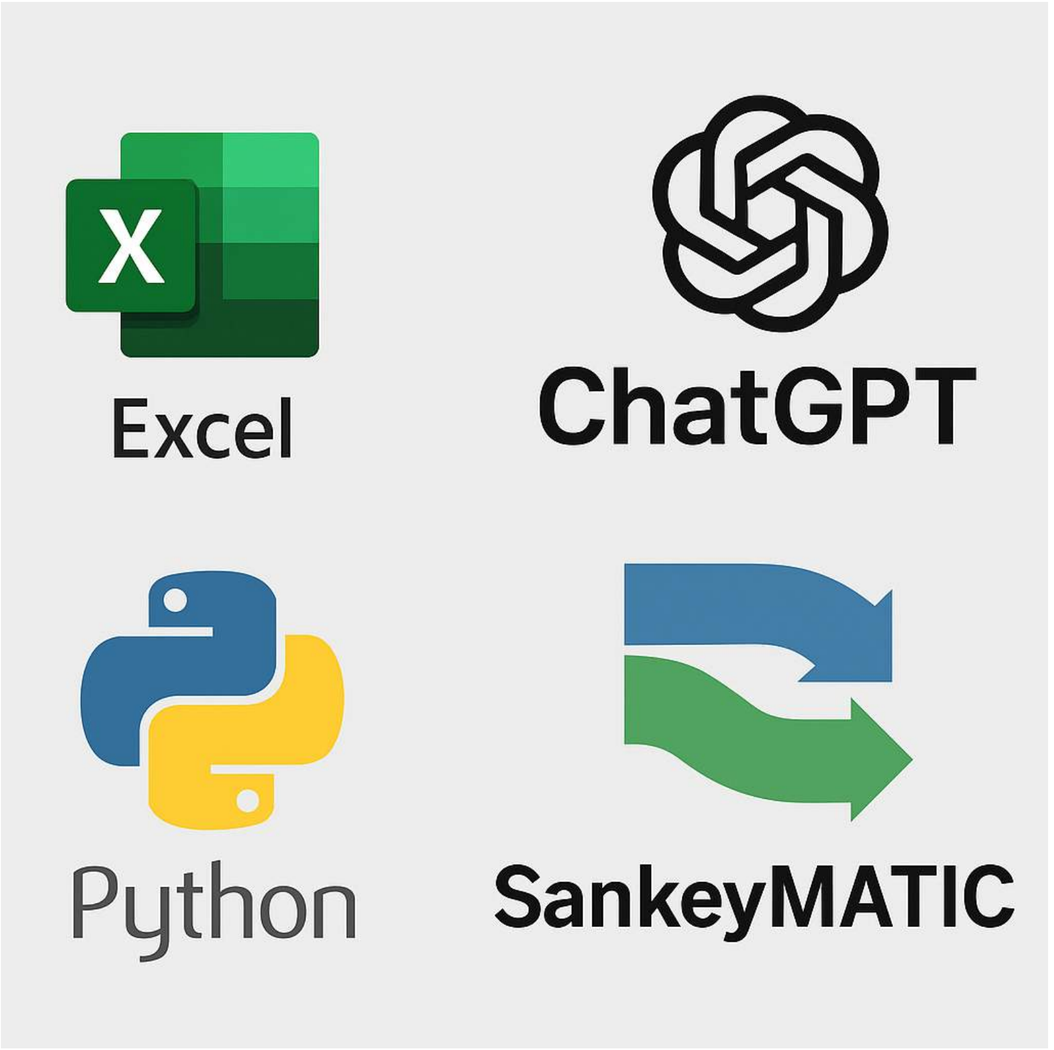
Reaching out to **points of contact** at colleges for **course alignment**


**Future Steps**

Developing **Articulation Agreements** between Community Colleges and 4-Year Colleges

# Software Tools Used

- **ChatGPT**
  - Image Creation/ Visualization Generation
  - Content Drafting
  - Data Analysis for Recommended Courses
- **Python**
  - Syllabus Library Creation
  - Data Cleaning & Standardization
- **Excel**
  - Initial Data Creation
  - Collaborative Sharing between Partners
- **SankeyMatic and Canva**
  - Visualization generation



# Why These Community Colleges Were Chosen

## Choosing Community Colleges

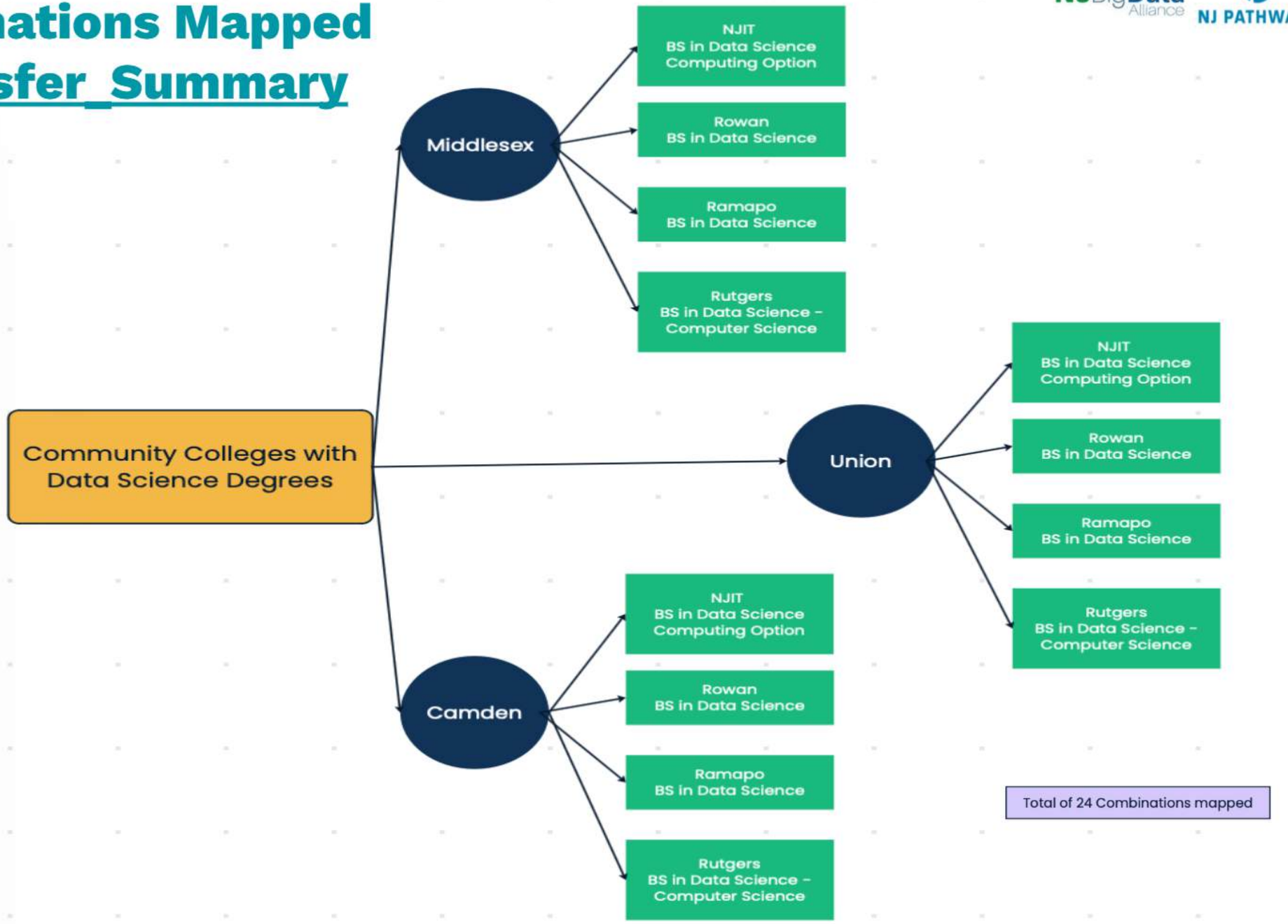
- **Middlesex, Union, and Camden:**
  - Offer a dedicated **A.S. degree in Data Science**
  - Clear pathway for students pursuing Data Science
- **Brookdale, Morris, and Essex:**
  - No standalone A.S. in Data Science
  - Offer **Data Science options** within Computer Science or Math programs
  - Provide foundational exposure to the field through related coursework

# Why These 4-Year Institutions Were Chosen

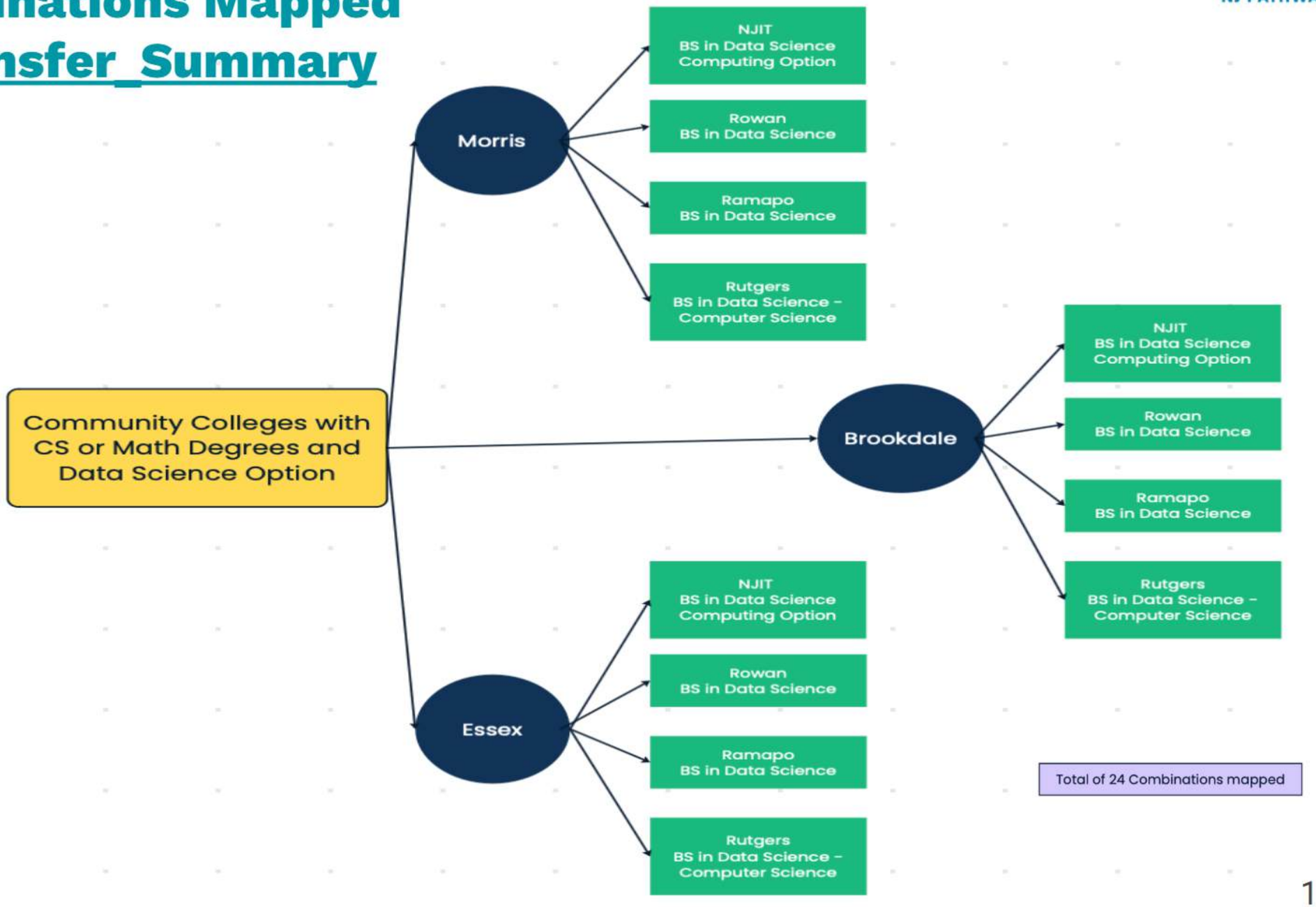
**Choosing 4-Year Institutions**

- Selected **NJIT, Ramapo, Rowan, and Rutgers**
  - Chosen based on **highest transfer student enrollment** among New Jersey four-year institutions

# Results: Combinations Mapped on Master_Transfer_Summary



# Results: Combinations Mapped on Master_Transfer_Summary



# Results + Insights

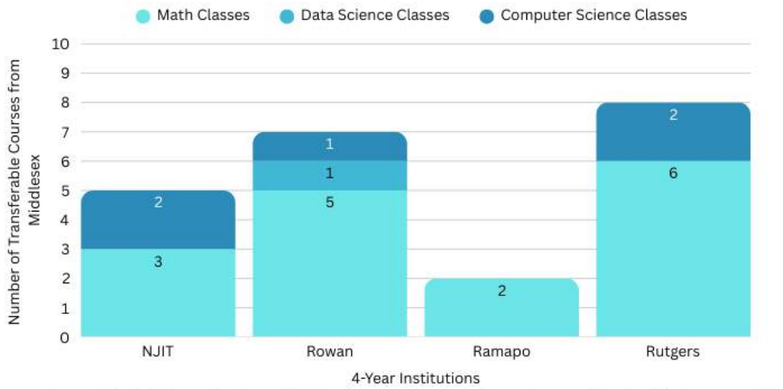
## Transfer Landscape is Inconsistent but Navigable

- Core courses like Calculus I & II, Linear Algebra, and Intro to Programming generally transfer well across most institutions
- Intro to Data Science and Discrete Structures are critical courses in 4-year curricula but inconsistently offered at 2-year colleges

## Transfer Gaps Exist Between 2-Year and 4-Year Institutions

- Some courses transfer only as electives, not at all, or require bundling
- Ramapo consistently accepts the fewest credits, while NJIT and Rowan are more transfer-friendly for technical subjects

## Best Transfer: Middlesex → 4-Year Institutions




pleae note that whether a class is a math, data science, or computer science class was determined by the course code

## Most Challenging Transfer: Brookdale → 4-Year Institutions

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **2-Year College** | **2-Year Code** | **2-Year Course Name** | **NJIT** | **Rowan** | **Ramapo** | **Rutgers** | **Notes** | | |
| 2 | Brookdale | MATH171 | CALCULUS I | 1 | 1 | 1 | 1 | Universal transfer | | |
| 3 | Brookdale | MATH172 | CALCULUS II | 1 | 1 | 0 | 1 | No Ramapo equivalent | | |
| 4 | Brookdale | COMP171 | PROGRAMMING I | 0 | 0 | 0 | 1 | Requires additional courses* | | |
| 5 | Brookdale | MATH131 | STATISTICS | 0 | 0 | 0 | 1 | Only Rutgers | | |
| 6 | Brookdale | MATH132 | INTRO DATA SCIENCE + APPLIED STATS | 0 | 0 | 1 | 0 | Ramapo DATA 101 | | |

# Methods: Python + AI -> Syllabi Matching

**Gather syllabi banks**

Download all syllabi banks of each community college from NJ Transfer

**Download (934) syllabi**

Each syllabi bank contains link to syllabus (PDF, DOCX, TXT files). Automate script to download each syllabus locally, calling GET requests + handling file type with proper extensions

**Data cleaning**

Next, apply section schema to extract sections of text (i.e. Description, objectives, etc). Extract data and tokenize

**Embed**

Use an embedding model to create vector embeddings on each section

**Similarity (15,878 scores)**

Use cosine similarity (or euclidean distance) to score each section pair between two syllabi, average to get overall score, create pairwise matrix of scores

**Training (Future)**

Train embeddings further or train a simple NN on “ground truth” transfers for prediction and insight extraction

# 2-Year Recommended College Courses

| Course Number | Course Name | Credits |
|---|---|---|
| **First Semester** | | |
| | Calculus 1 | 4 |
| | Statistics for Data Science | 3 |
| | Intro to Programming for Data Science I (Python) | 3 |
| | | |
| **Second Semester** | | |
| | Calculus II | 4 |
| | Data Science 101 | 3 |
| | Intro to Programming for Data Science II (Python) | 3 |
| | | |
| **Third Semester** | | |
| | Linear Algebra | 3 |
| | Data Science Elective | 3 |
| | | |
| **Fourth Semester** | | |
| | Discrete Mathematics/Structures | 3 |
| | Probability | 3 |
| | Data Ethics | 3 |
| | | |

Last Semester's Team Reccomendations Below:

| Course Number | Course Name | Credits |
|---|---|---|
| **First Semester** | | |
| | Calculus 1 | 4 |
| | Intro to Programming (Python 1) | 3 |
| | Intro to Data Science | 3 |
| | | |
| **Second Semeste** | Calculus II | 4 |
| | Python 2 (Programming II) | 3 |
| | | |
| | | |
| **Third Semester** | Data Structures | 3 |
| | STEM or Math Elective | 3 |
| | | |
| | Statistics for Data Science | 3 |
| **Fourth Semester** | | |
| | Data Visualization | 3 |
| | Data Ethics | 3 |
| | STEM-relative or free elective | 3 |

# Recommendations

**Potential NJ Transfer Enhancements**

- List all schools in NJ Transfer's course-level search, allowing for accurate advising
- Add Syllabi Banks for 4-Year Institutions
- Incentivize 4-year schools to provide data to NJ Transfer on a regular basis*
- Alert 2-year and 4-year administrators to return course equivalencies when a new course is added/modified

# Next Steps

## Next Steps for Transfer Summary Sheet

- **Expansion Opportunities**: Add more courses and institutions pairings to our analysis
- **Identify what's "missing":** Identify key content differences between similar courses
- **Outreach:** Reach out to school reps to discuss course revisions based on findings

## Next Steps with Python

- **With More Syllabi**:
  - Train embeddings to align transferable course content.
- **Without More Syllabi**:
  - Use existing matrix to extract and analyze high-similarity course pairs.
    - False positives? Improve embeddings or refine sectioning.
    - True similarity but no transfer? Investigate reasons (objectives, language, tech, etc.).:
- Use mean embedding vectors to design an "ideal" 4-year Data Science syllabus.

# Thank You and Acknowledgements


- Thank you to our Rutgers MBS advisors Dr. Karen Bemis and Lori Dars
- Thank you to our mentor Dr. George Avirappattu
- Thank you to Nick Picioccio
- Thank you to Thea Olsen
- Thank you to the New Jersey Big Data Alliance
- Thank you to the MBS Externship Exchange program
- Thank you to the prior externship teams involved
- Thank you to New Jersey Pathways


# Questions?

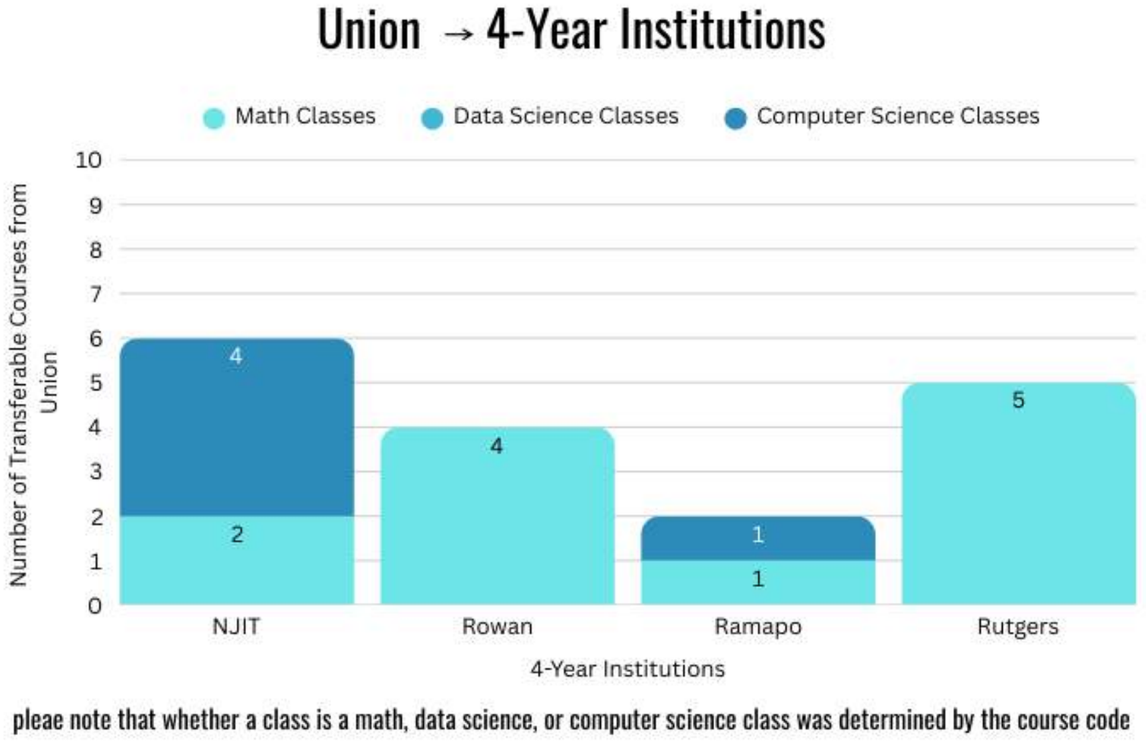
# Supplemental Information

# Results: Data Summarization

- **2YR_DS_Degrees** – 2-year NJ colleges offering Data Science degrees
- **2YR_CS_Math_Degrees** – 2-year NJ colleges offering Computer Science or Mathematics degrees with a Data Science option
- **4YR_DS_Degrees** – 4-year NJ colleges offering Data Science degrees
- **Master_Transfer_Summary** – Summary of transferable courses from 2-year to 4-year NJ colleges
- **Gold_Star_Colleges** – Courses offered in the first four semesters at ten gold-star 4-year colleges
- **Recommended_2YR_Courses** – Recommended Data Science, Computer Science, and Math courses for 2-year NJ colleges that will transfer to 4-year colleges

# Results: Union -> 4-Year Institutions

- **CST206 – Data Science** only transfers to Ramapo; *not accepted* as an Intro to Data Science course at other major colleges.
- **MAT267 – Discrete Mathematics** transfers to Rutgers as Intro to Discrete Structures I,
  but **does *not* transfer to Ramapo's Discrete Structures**, raising consistency concerns.
- **CST261 – Data Structures** expected to align with Rowan's Principles of Data Structures,
  but **only transfers to NJIT as Intro to CS II**.
- **MAT171 - Unified Calculus I** successfully transfers to all universities
  **MAT172 - Unified Calculus II** transfers to NJIT, Rowan,
  **MAT271** - Rutgers **Unified Calculus III** transfers to Rutgers and Rowan
- **MAT265 - Linear Algebra** only transfers to Rutgers
- Only two courses transfer from Union to Ramapo–which is a point of concern to further look into



# Results: Camden to 4-Year Institutions

**Math Alignment**

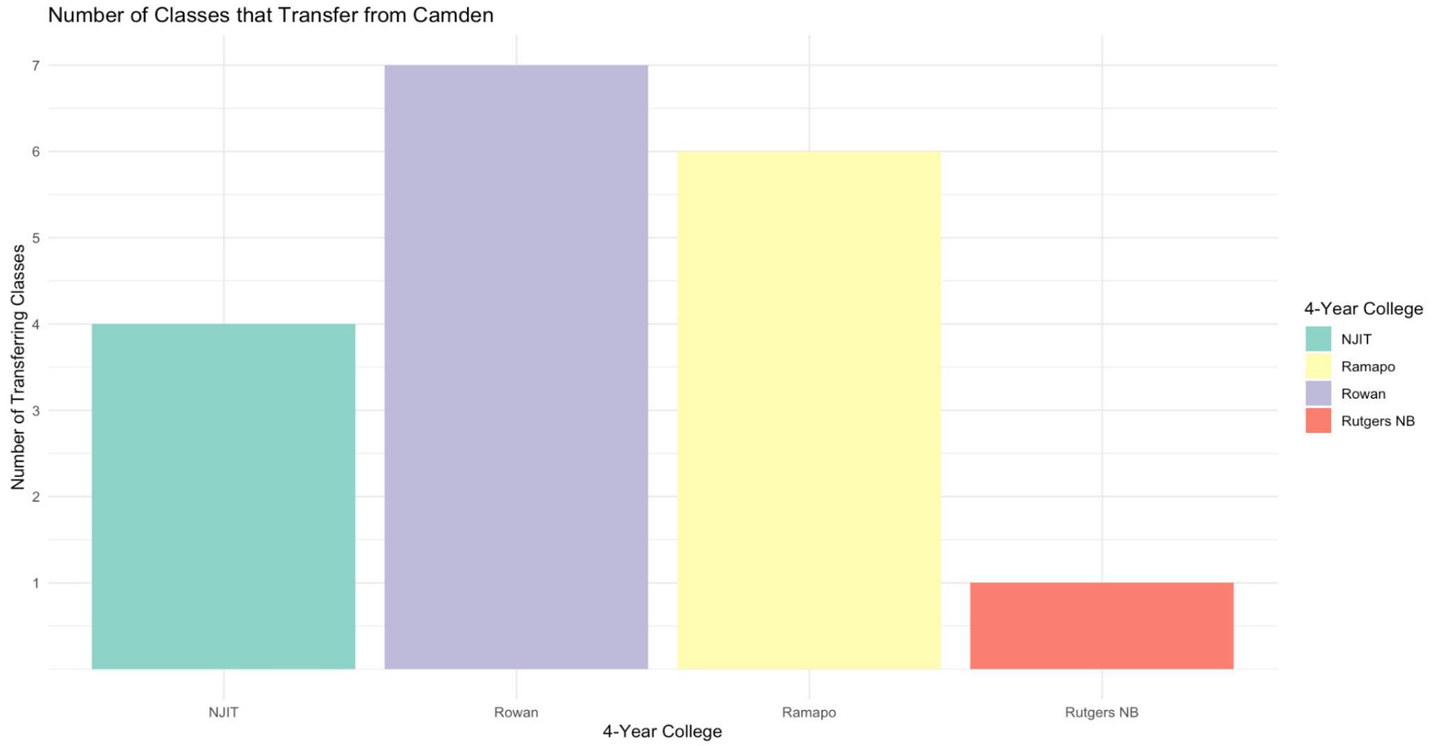
- **Calculus I, II,** and **Linear Algebra** transfer well to **NJIT**, **Rowan**, and **Ramapo**
- **Discrete Math** transfers to **Rowan** but not **Ramapo or Rutgers**

**Computer Science Transfers**

- **Intro to Python** courses are accepted well to **NJIT**, **Rowan**, and **Ramapo**.
- **Computer Science II** courses transfer to **NJIT** and **Rutgers**, but not to **Rowan** or **Ramapo**

**Data Science Courses**

- **Data Science I & II** transfer to **Rowan** and **Ramapo**



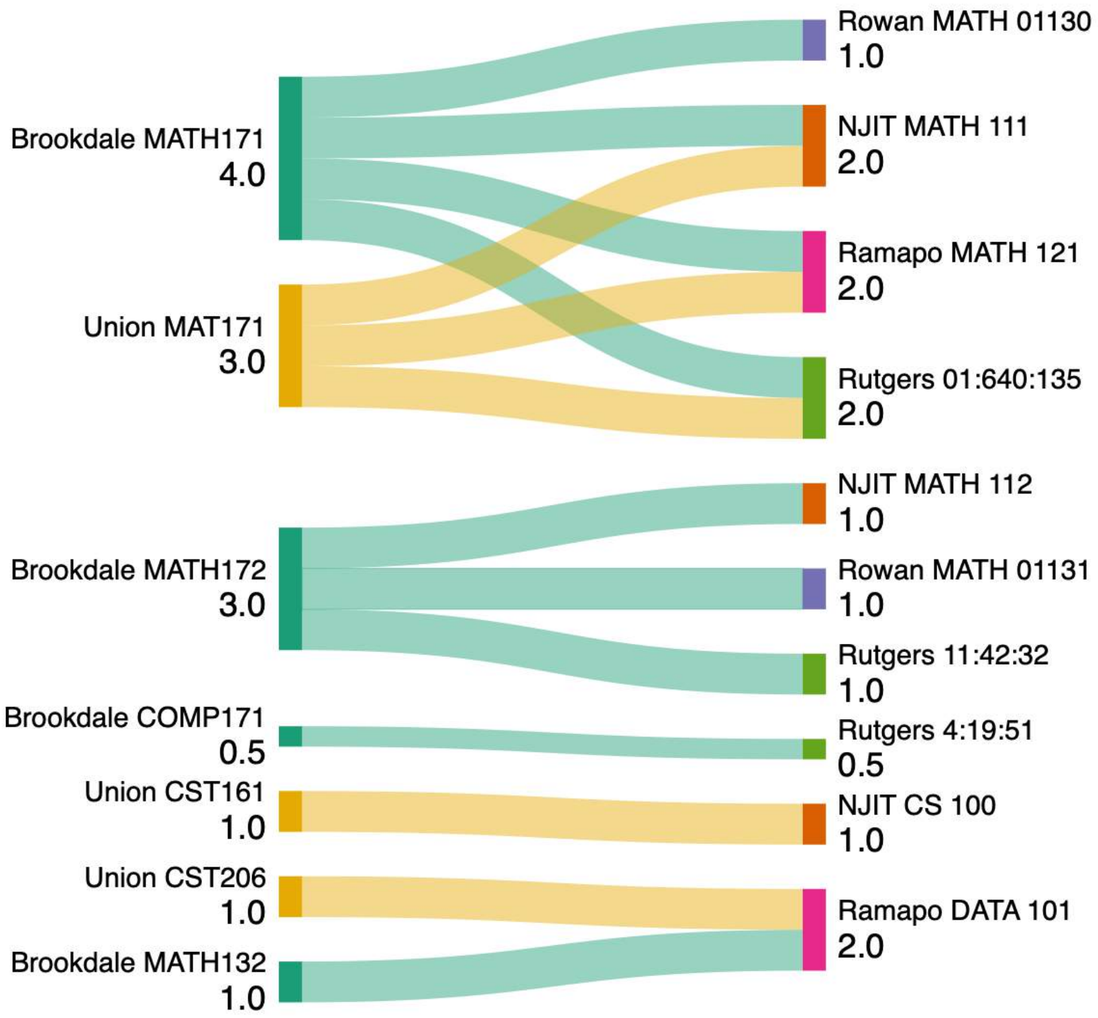
# Results - Brookdale to 4-Year Institutions (cont.)

**New Opportunities**

- Facilitate Syllabus Sharing: Encourage colleges to publish detailed syllabi
- Pilot Inter-School Course Reviews: Create joint faculty panels for course audits
- Reward Transfer-Friendly Design:Incentivize transparent, equitable transfer practices

**Recommendations**

- Align Core Courses: Standardize outcomes for Calculus, Programming, Data Structures
- Improve Elective Recognition: Accept more advanced CS/DS electives (e.g., AI, Web Dev)
- Fix Credit Conversion Issues: Promote consistent 4cr = 4cr transfers across schools



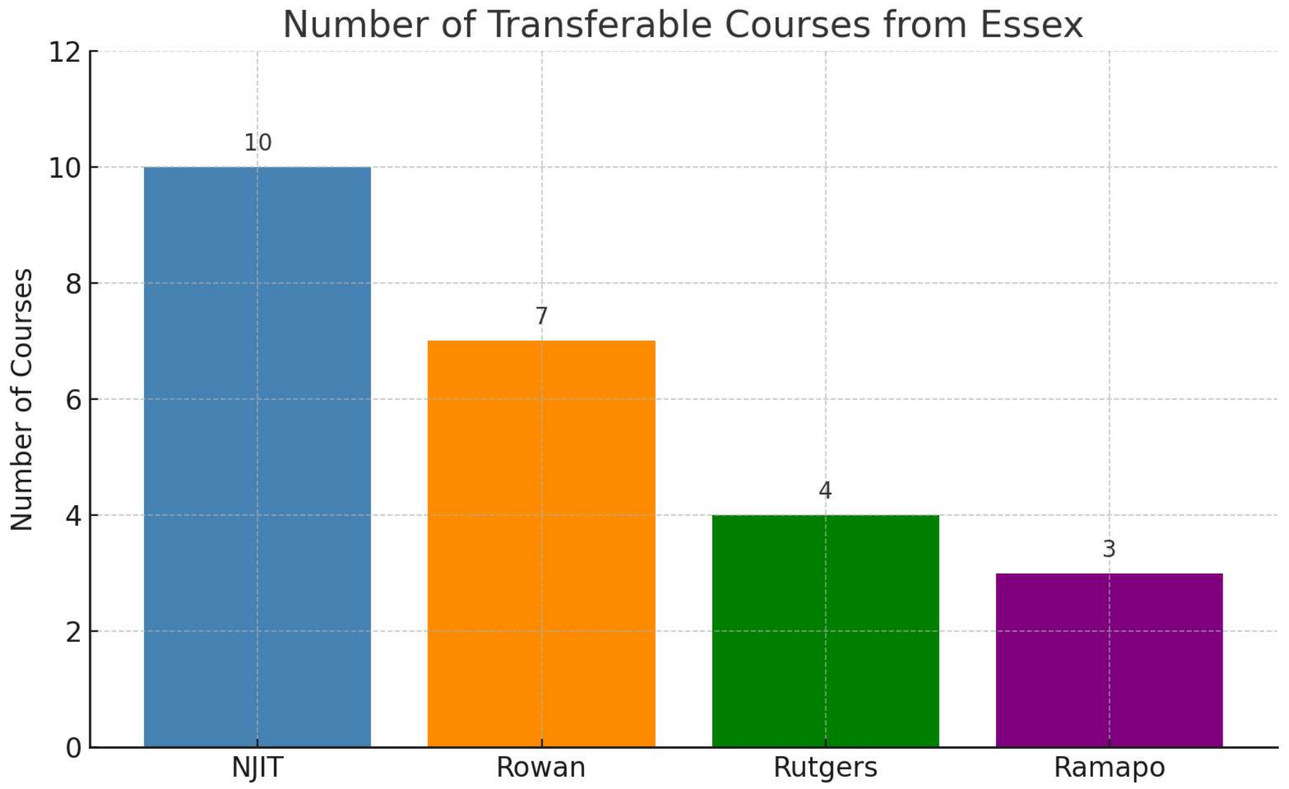
# Results: Essex County College to 4-Year Institutions

- Some courses fully match (like CSC121 → CS100 at NJIT), while others only partially map, require grouping (like CSC121 + CSC122 + CSC225 = 4 credits at Rutgers), or are missing direct equivalents (e.g., CSC137 not existing at Rowan).

**Key Insights:**

- **Standard Core Courses:** Certain courses like Calculus I, Calculus II, Linear Algebra, Discrete Mathematics, Computer Science I & II are required everywhere.

- **Data Science Emphasis:** Newer electives like Data Science Introduction, Information Visualization, Statistical Learning are built into transfer pathways, particularly at Rowan and Rutgers.



# Results: Morris to 4-Year Institutions

**Math Alignment**

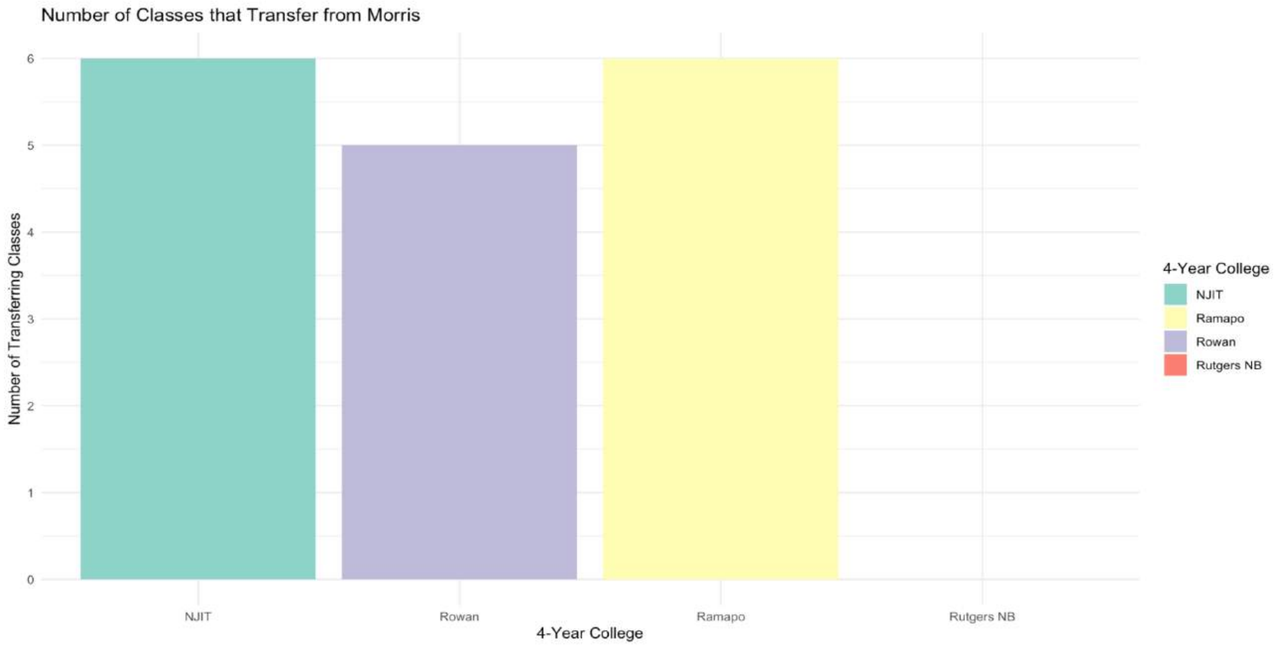
- **Calculus I & II, Linear Algebra**: Transfer to **NJIT**, **Rowan**, and **Ramapo**
- **Calculus III**: Transfers to **Rowan**
- **Discrete Math**: Transfers to **Rowan** and **Ramapo**

**Computer Science & Programming**

- **Intro to Python course**: Transfers to **NJIT**, **Rowan**, and **Ramapo**
- **Computer Science II** : Transfers to **NJIT** only
- **Data Structures**: Transfers to **NJIT** and **Rowan**

**Data Science Alignment**

- **Intro to Data Science**: Transfers to **Ramapo**
- **Data Science Programming**: Transfers to **Ramapo**



# Results: Most Common Classes That Transfer (Morris and Camden)

1. **Calc I**
2. **Calc II**
3. **Linear Algebra**
4. **Intro to Computer Programming(Python)**
5. **Intro to Data Science**

# Essential Learning, General Education, and Career Readiness Collaborative

**Karen Bearce,**
Raritan Valley Community College

# Essential Learning, General Education, and Career Readiness Collaborative

**Why is this Collaborative Needed?**

Through the NJ Pathways initiative, colleges are hearing from employers and industry partners that, in addition to job-related skills, they need employees with durable skills. These durable skills are the essential learning that is embedded in General Education courses.

# Essential Learning, General Education, and Career Readiness Collaborative

All students at NJ's community colleges are required to complete 21-33 credits of General Education (the amount differs based on their degree type). General Education prepares students for further study, engaged citizenship, personal development, lifelong learning, and career readiness. Students are rarely aware, however, of the critical connections between their General Education coursework and career readiness.

## EDUCATION PARTNERS:

Atlantic Cape Community College

Bergen Community College

Brookdale Community College

Camden County College

Mercer County Community College

Middlesex College

County College of Morris

Ocean County College

Passaic County Community College

Raritan Valley Community College

Rowan College of Burlington County

Salem Community College

Sussex County Community College

UCNJ Union College of Union County, NJ

# Essential Learning, General Education, and Career Readiness Collaborative

**This project brings together faculty and administrators from 14 Community Collegs to discuss the career readiness competencies that are embedded in their courses and strategies to make the connections between General Education and career readiness transparent to students.**

### National Association of Colleges and Employers (NACE) Career Readiness Competencies:

| | | |
|---|---|---|
| Communication | Critical Thinking | Professionalism |
| Leadership | Equity & Inclusion | Career & Self-Development |
| Teamwork | Technology | |

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Essential Learning, General Education, and Career Readiness Collaborative

## Pathway Connection Progress:

Over 100 faculty and administrators from disciplines such as Communication, English, History, Mathematics, Philosophy, Science, Social Science, Technology, and World Language participated in three statewide convenings. These sessions focused on embedding NACE Career Readiness Competencies into course outcomes and designing assignments that help students articulate their career preparation. Faculty also worked locally with their campus colleagues to advance these efforts.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Essential Learning, General Education, and Career Readiness Collaborative

## Ongoing Efforts:

Creation of a shared repository to collect and disseminate revised course materials and ideas.

## Ancillary Activities or Outcomes:

This work is informing a parallel project to revitalize the General Education Framework in use at NJ's community colleges.

## Words of Advice:

Sometimes all it takes is a new lens—in this case, the NACE Competencies—to spark innovation from passionate faculty as they continuously revise their meaningful courses, activities and assignments for the students.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

**Professional Development**

Pilot

# Essential Learning, General Education, and Career Readiness Collaborative

### Pathway Connection Progress:

More than 100 faculty and administrators attended a presentation from Dr. Niesha Taylor, Director of Career Readiness at NACE, introducing the Career Competency Approach (November 8, 2025). Faculty continued conversations at the local level, sharing the model and exploring how to apply it within their own disciplines.

### Ongoing Efforts:

Faculty began piloting revised assignments and assessments in Spring 2025 courses. This iterative approach will allow for summer evaluation and scaling in Fall 2025.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

**Professional Development**

Pilot

# Essential Learning, General Education, and Career Readiness Collaborative

## Ancillary Activities or Outcomes:

**The initiative is reshaping how students perceive General Education—not as a checklist, but as an essential part of career preparation.**

## Words of Advice:

**“Good things take time. Better things take a little longer.” Faculty-led innovation flourishes when time and space are provided for reflection and creativity.**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

**Professional Development**

Pilot

# Essential Learning, General Education, and Career Readiness Collaborative

### RVCC Holds Kickoff for Statewide Initiative Focusing on General Education, Career Readiness

Thursday, November 14, 2024

Understanding the importance of providing students with the "soft skills" and "durable skills" valued by employers to succeed in today's job market, Raritan Valley Community College launched the Pathways to Career Initiative, "Essential Learning, General Education, and Career Readiness Center for Workforce

# Geographic Information Systems Certificate (GIS) Development

**Joe Diaco,**
Camden County College

**Claire Condie,**
Middlesex College

**Burl Yearwood,**
Hudson County Community College

**Jason Fruge,**
Sussex County Community College

# Geographic Information Systems Certificate (GIS) Development

## Community College Education Partners:

Camden County College

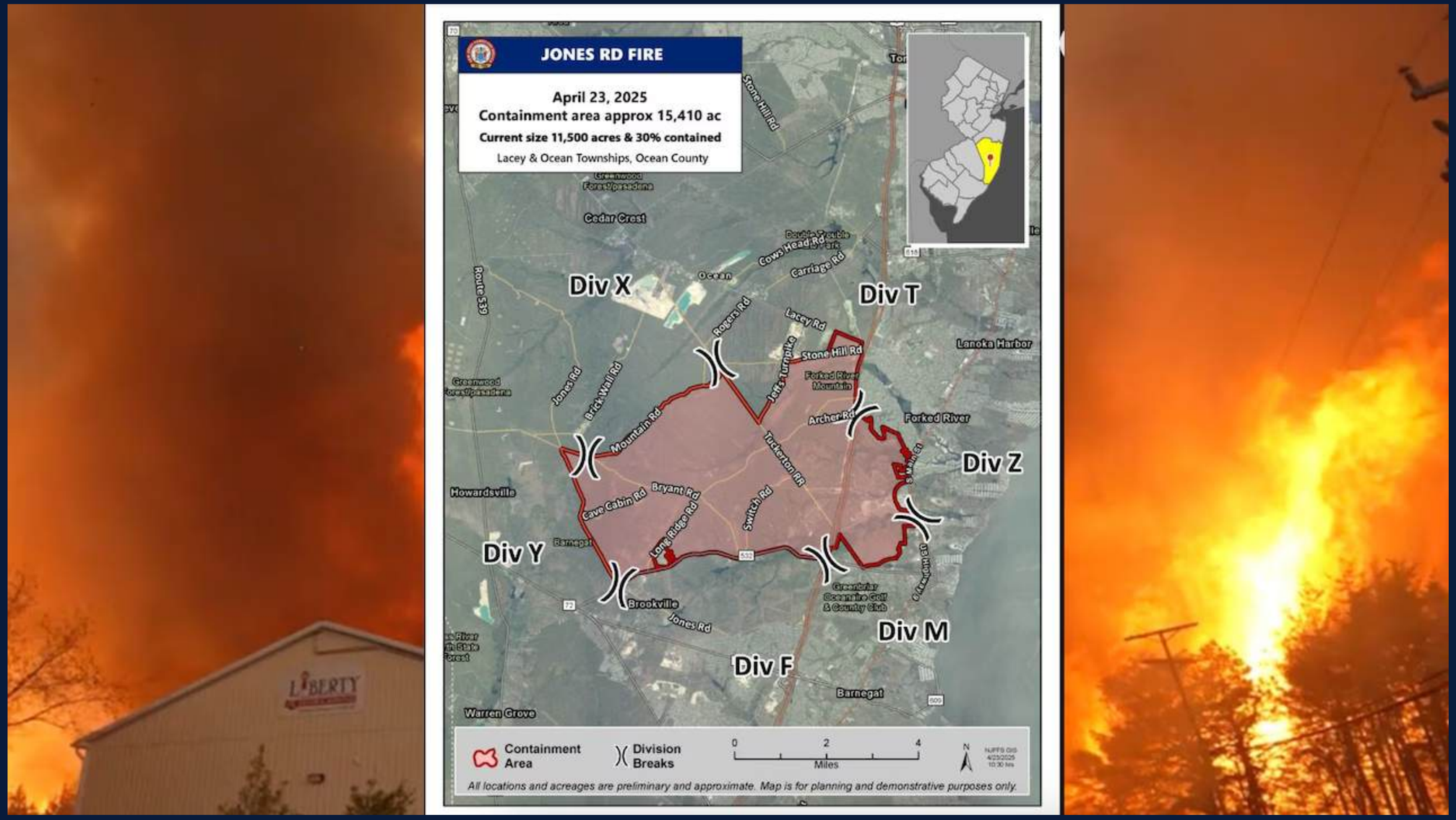
Hudson County Community College

Middlesex College

Sussex County Community College

The Geographic Information Systems (GIS) Development project is a statewide collaboration led by Camden County College, Hudson County Community College, Middlesex College, and Sussex County Community College. Together, these colleges are designing and implementing GIS certificate programs to meet the growing workforce demand for spatial data analysis and visualization professionals. The project is designed to serve adult learners, traditional college students, and high school students via dual enrollment, and includes connections to community-based organizations and industry.

# What is GIS?


JONES RD FIRE
April 23, 2025
Containment area approx 15,410 ac
Current size 11,500 acres & 30% contained
Lacey & Ocean Townships, Ocean County
Div X
Div T
Div Z
Div Y
Div M
Div F
Cedar Crest
Ocean
Lanoka Harbor
Forked River
Howardsville
Brookville
Barnegat
Warren Grove
Containment Area
Division Breaks
Miles
All locations and acreages are preliminary and approximate. Map is for planning and demonstrative purposes only.

# EDUCATION PARTNERS:

- Camden County College
- Middlesex County College
- Hudson County Community College
- Sussex County Community College
- Newton High School
- Sussex County Technology High School
- High Point Regional High School
- Wallkill Valley High School
- Project Sufficiency/NJ Youth Corp
- Civil Solutions (a subsidiary of ARH)

# Geographic Information Systems Certificate (GIS) Development

**The GIS certificates equip students with foundational and advanced skills in GIS technologies, preparing them for careers in fields such as environmental management, infrastructure planning, and business analytics.**

**Each partner college is developing either non-credit or credit-bearing certificates, embedding industry credentials, and aligning to employer needs.**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

## Pathway Connection Progress:

**Camden County College finalized a 34-credit GIS certificate, including 4 new courses:**

- **Introduction to GIS**
- **Mapping & Cartography**
- **Remote Sensing**
- **Capstone course**

**Middlesex College developed a 30-credit certificate with aligned outcomes:**

- **Ongoing internal discussions to embed GIS into:**
  - **AAS in Computer and Information Systems**
  - **Computer Programming Certificate**
- **Presentation of new GIS courses (GIS-101, GIS-210, GIS-280) scheduled for September departmental meeting.**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

### *Certificate Requirements:*

| | | |
|---|---|---|
| **First Semester** | | **Prerequisites** |
| ENG-101 English Composition I | 3 | ENG-013 AND ENG-023 OR ENG-046 |
| DSC-101 Data Science I | 3 | ENG-013 AND ENG-023 OR ENG-046 AND MTH-100 |
| CAD-101 Computer Aided Engineering Graphics | 4 | |
| GEO-101 Cultural Geography | 3 | ENG-013 AND ENG-023 OR ENG-046 |
| GIS-101 Introduction to Geographic Information Systems | 3 | ENG-013 AND ENG-023 OR ENG-046 AND MTH-029/035 OR Proper Placement Exam Scores |
| | **16** | |
| **Second Semester** | | |
| CSC-171 Introductory Python Programming | 3 | |
| GIS-201 Mapping and Cartography | 3 | GIS-101 |
| GIS-210 Remote Sensing | 3 | GIS-101 |
| CAD-205 Architectural CADD Using Revit | 3 | CAD-101 |
| CAD-208 Autocad Civil 3D Level 1 | 3 | CAD-101 |
| | **15** | |
| **Third Semester** | | |
| GIS-280 Geospatial Solutions: Project Design & Professional Applications | 3 | GIS-201 AND GIS-210 |
| | **34** | |

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

***Comparison Table: CCC GIS.CT 34 credits vs MC 30 credits***

| First Semester: | | | |
|---|---|---|---|
| **Middlesex College** | Credits | | Camden County College |
| ENG 121 | 3 | English Composition | ENG 101 |
| MEC 123 | 3 | Technical Graphics/CAD I | CAD 101 |
| CSC 106 | 3 | Intermediate PC Appl w/Prog | |
| DSA 110 * | 3 | Intro Data Science & Analytic | DSC-101 |
| GIS- 101 (new) | 4 | Introduction to GIS | GIS 101 |
| **Second Semester** | | | |
| CSC -135 | 4 | Intro. to Programming Python | CSC-171 |
| GLS-131 | 3 | World Geography | GEO - 101 |
| GIS- 210 (new) | 3 | Remote Sensing | GIS 210 |
| CIT-126 | 3 | Advanced Civil Drawing/CAD-II | CAD-208 |
| **Third Semester (summer)** | | | |
| GIS-280 (new) | 4 | Geospatial Solutions: Project Design & Professional Applications | GIS-280 |
| *CSC 106 Must be taken either prior to or at the same time as this course | | | |

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

## Challenges:

- Mapping existing courses and ensuring academic alignment.
- Aligning existing courses and avoiding student barriers.

## Solutions:

- Developed stackable credit pathways into associate degrees.
- Identified support courses across departments.
- Strong collaboration between faculty and academic coordinators.

## Ancillary Activities:

- Potential for students to pursue technical or BS degree after certificate completion, or lateral movement into the Technical Studies AAS degree.
- Exploration of internship and hybrid/online delivery formats.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

**Community College (Credit)**

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

### Pathway Connection Progress:

**Sussex County Community College is continuing development of 30-credit GIS certificate program.**

### Challenges:

**Aligning current course inventory with GIS competencies.**

### Solutions:

**Collaboration across departments to identify course overlaps.**

### Ancillary Activities:

**Enables students in computer/software degrees to pursue lateral moves into GIS.**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

**Community College (Non Credit)**

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

### Introduction to GIS Certificate

**Hudson County Community College designed a non-credit Introduction to GIS Certificate focused on the construction industry. The certificate provides a thorough understanding of GIS encompassing key concepts, applications, and software platforms.**

### Pathway Connection Progress:

- **Conducted extensive research and developed curriculum focused on spatial data analysis for construction.**
- **Current employment trends were analyzed, and the role and impact of small businesses in this sector.**
- **Industry advisory board established and marketing initiated via the college website.**
- **Programming scheduled to begin Summer 2025.**

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

**Community College (Non Credit)**

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# Geographic Information Systems Certificate (GIS) Development

### Topics Covered:

- **Spatial Data Acquisition and Management.**
- **Spatial Analysis Fundamentals.**
- **Environmental Applications of GIS.**
- **Human Geography and Urban Planning.**
- **3D City Modeling and LIDAR Data Processing.**
- **Infrastructure Analysis, Environmental Sustainability, Community Analyst, and Business Analyst.**

# EV Internship and Faculty Development Pilot

**PJ Ricatto,**
**Rebekah Han, Patrick Meagher,**
**Alejandro Olarte, Jonathan Barak,**
Bergen Community College

**Ethan Tassio,**
**Ben Myshka,**
Raritan Valley Community College

# EV Internship and Faculty Development Pilot

**Education Partners:**

Bergen Community College

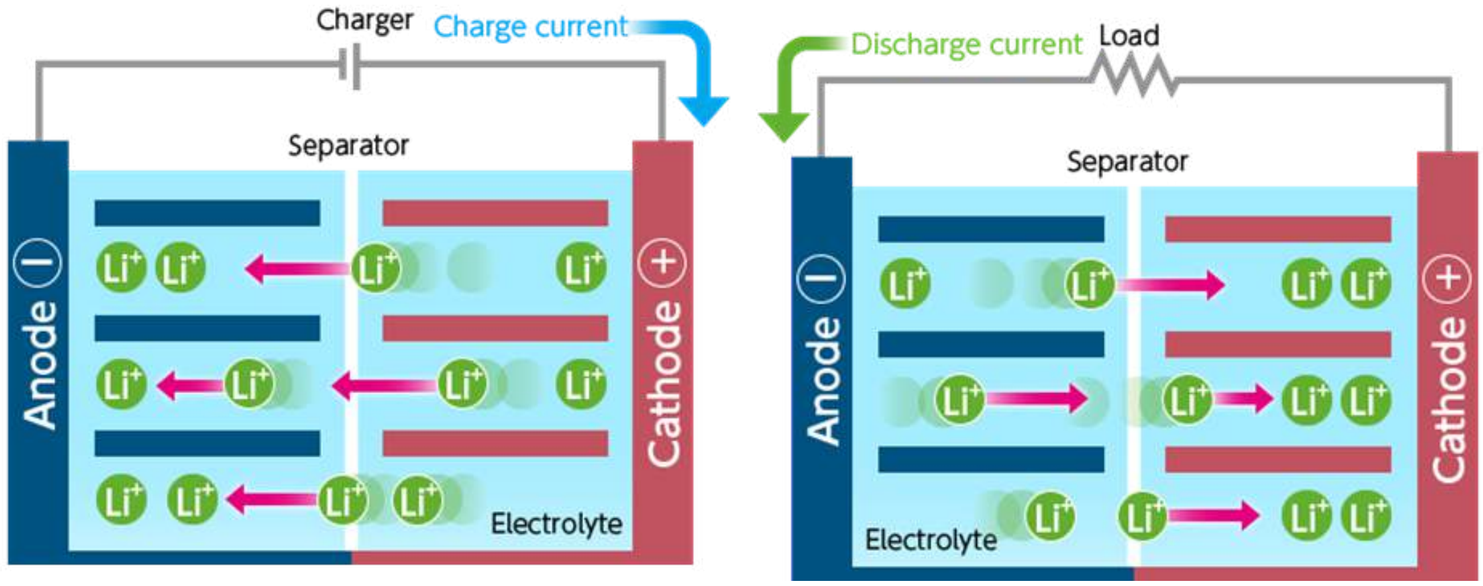
Raritan Valley Community College

Brookdale Community College

**The EV Internship and Faculty Development Pilot is a collaborative project between Bergen Community College, Raritan Valley Community College (RVCC), and Brookdale Community College aimed at expanding workforce training in Electric Vehicle (EV) technology through internships, faculty development, and articulation agreements. This project provides hands-on internship experiences for students in EV-related industries and supports faculty participation in high-quality professional development through the Electric Vehicle Education for New Jersey (EVE-NJ) project, funded by the National Science Foundation.**

# EV Rover Awareness Laboratory

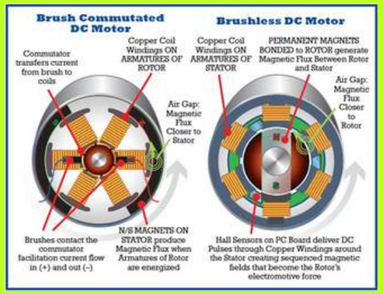
**Steven Cohen,**
**Teacher of Mechatronics,**
**Applied Technology High School**
**Bergen County Technical Schools**
**Paramus NJ**




**How lithium Batteries Work**

**PhyPhox IMU Analysis App**

**Electric Motor Analysis**



# Best Practices Guide: EV Go-Kart Design Challenge

## 2023 AACC/NSF Community College Innovation Challenge

## Finalists

# EV Go-Kart Design Challenge

**The EV Go-Kart Design Challenge created in NJ Pathways Year I was piloted at four participating high schools in Year 2:**

1. **Bergen County Technical School - Teterboro**
2. **Applied Technology High School - Paramus**
3. **John Dwyer Technology Academy - Elizabeth**
4. **Thomas Edison Career and Technical Academy - Elizabeth**

# EV Go-Kart Design Challenge

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

**Experiential Learning**

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

**Pilot**

# EV Internship and Faculty Development Pilot

**Pathway Connection Progress:**

This May four Bergen Community College (BCC) Engineering and Engineering Technology students completed a 100-hour internship at VOLVO USA headquarters in Mahwah, NJ. The students divided their time between the Tech Training Center and the Battery Development Group.

A second BCC cohort is scheduled to begin in early June.

Sixteen Raritan Valley Commnity College (RVCC) students will begin Automotive Service professional internships this summer at local automotive dealerships. Traditional internship experiences have been adapted to include an EV service component.

# Internship Summary

Spring 2025


VOLVO

# What I Learned - Rebekah

- **Car servicing**
  - Tire pressure, oil changes, software updates, registration
  - Diagnosing problems (problem-solving)
  - Exposure to power tools
  - (Enjoyed) test driving the cars
- **Exposure to VIDA** (diagrams, how-tos) and how repairs are documented
- **About myself** – I really enjoyed the hands-on aspect
  - I'm changing my major to electrical engineering
  - I need a garage; I want to stay in the automotive industry
- Working in a **corporate space** (Microsoft Teams) and as a team
  - I initially thought the garage door was automatic
- What might impact the **SOH** of batteries/battery faults
  - Connection between the shop and then looking at TIE/DRO
- How much branding and company vision (personally) matters

# What I learned - Alejandro

- **Car servicing**
  - How to rotate tires, changing oil, fixing/diagnosing other issues with the car
  - PDI's (Pre-Delivery Inspection)
- **Data Analysis**
  - Using TIE and DRO to find SOH levels of batteries before and after they were restored
- **Würth & Snap-On**
  - Seeing the types of tools used in workshops has taught some of the tools I should be using to fix my own car or even for personal projects
- **Car Design**
  - Seeing Volvos up close taught me a multitude of things of how Volvo cars are made especially how designers/engineers think.
- **How to work in a corporate environment**
  - I have learned to communicate to others in a corporate manner as well as communicating through Microsoft Teams as it was my first time using the app

# What I learned – Patrick

## Industry Exposure & Operational Insight

- Gained valuable insight into the structure and strategic priorities of the automotive industry through hands-on experience.
- Observed the efficiency of Volvo's service workflows, particularly those enabling fleet uptime and minimizing operational disruptions.

## Technical Learning & Understanding of Systems

- Developed a deeper working knowledge of failure diagnostics across electric and internal combustion platforms (Using DRO & TIE) critical for interpreting emerging EV/ICE market dynamics.
- Utilized battery pack health data (SOH) and module-level diagnostics to assess common failure causality and improve predictive maintenance and battery recycling strategies.
- Identified how production consistency and component aging affect long-term performance, drawing parallels with degradation patterns seen in other high-use consumer electronics.
- Benefited from a collaborative and professional work culture. The Volvo teams were supportive, and the environment was welcoming and well-structured.

## Design Philosophy & User Centric Engineering

- Studied Volvo's design philosophy—where form serves function—to enhance safety, usability, and user trust in both daily and use case-critical contexts.
- Connected personally with Volvo's brand ethos: a commitment to resilience, reliability, and safeguarding what matters most, underscoring the impact of thoughtful, innovative, and robust engineering.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

**Experiential Learning**

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

**Pilot**

# EV Internship and Faculty Development Pilot

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

**Experiential Learning**

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

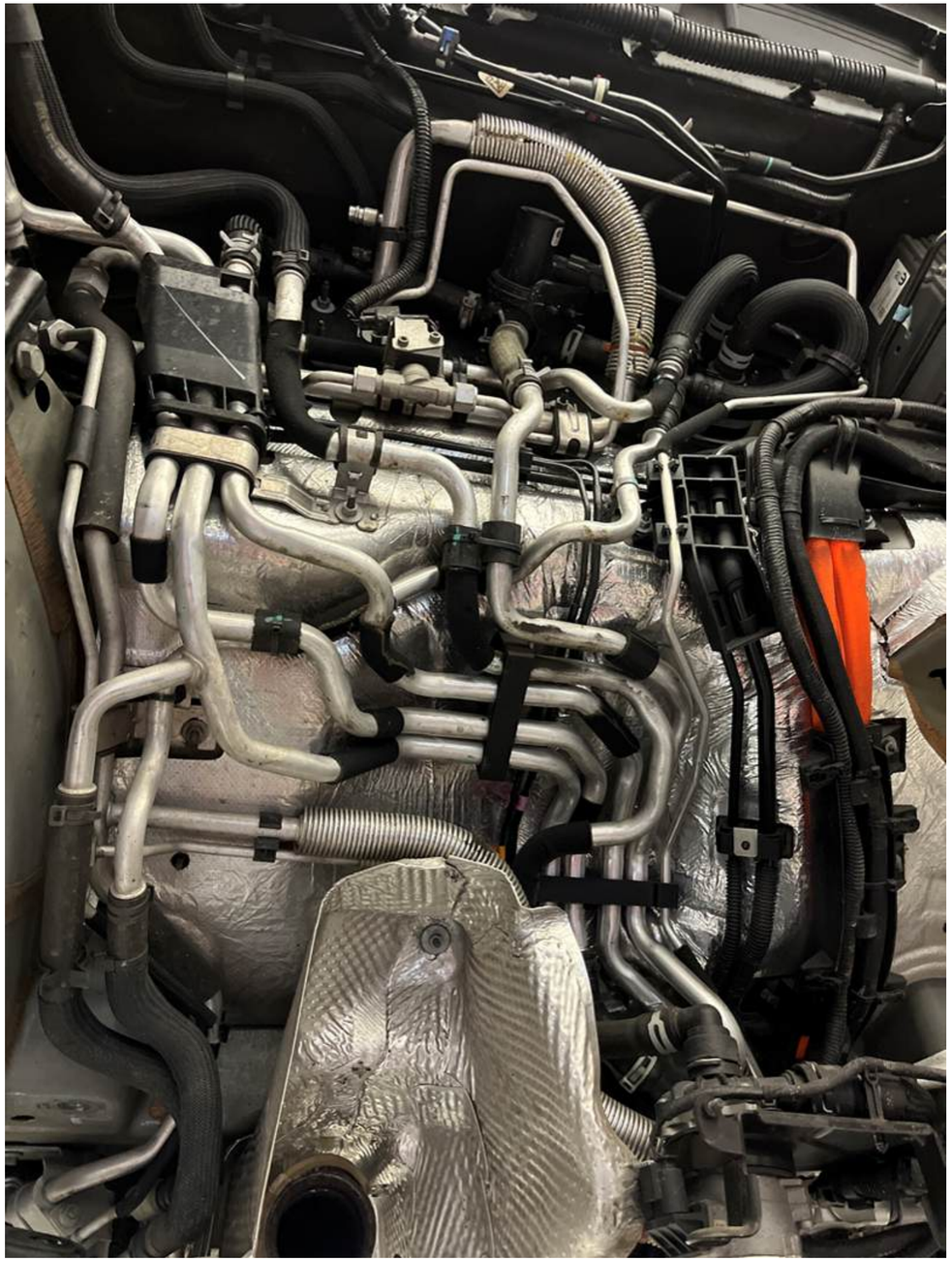
**Pilot**

# EV Internship and Faculty Development Pilot


# Pacifica Hybrid Firewall

Electric Powertrain assembly removed from vehicle for engine replacement.

- Amount of cooling hoses and a/c plumbing required for optimal and safe operation of this vehicle.
- 3-way coolant valve for controlling flow through the heater core to provide cabin heat.
- Bottom right mounted to the bracket is an electric coolant pump.
- Orange cables are the positive and negative leading from the high voltage battery (380V DC) to the Power-Inverter Module mounted on top of the electric transmission (E-CVT).



# High Voltage Battery from the STLA Large Platform

These photos are the Stellantis Boston Training Center.

I was fortunate enough to be able to take a 3-day class to learn about electric vehicles and do vehicle specific training on the Promaster BEV.

This is from a segment of training where we went over safe high voltage BEV battery lifting procedures as they weigh about 1,400~ lbs.

This additional training was fully sponsored by my dealership.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

**Connection between Community Colleges (1+1)**

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

Professional Development

Pilot

# EV Internship and Faculty Development Pilot

### Pathway Connection Progress:

Bergen Community College faculty members have aligned the General Education (GE) and core courses to support a 1+1 articulation agreement in Automotive Technology. The goal is to allow students to complete their first year at BCC and transfer to either Brookdale or RVCC to complete the Automotive Service Technician degree with an EV specialization in their second year.

## PATHWAY CONNECTIONS:

Connection to High School (Non-Credit)

Connection to High School (Dual Enrollment)

Community College (Non Credit)

Community College (Credit)

Apprenticeship Development

PLA for Apprenticeship RTI

PLA

Connection between Community Colleges (1+1)

Experiential Learning

Connection to CBOs

Adult Learners

Adult Literacy

Connection to 4-Yr College/University

**Professional Development**

Pilot

# EV Internship and Faculty Development Pilot

**Pathway Connection Progress:**

CTE faculty from Bergen and RVCC have access to EV service technology professional development sessions hosted through the EVE-NJ NSF-funded program.

One Bergen CTE faculty member has already completed an EV training program.

NJ PATHWAYS TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce
SUMMIT 2025

# PATHWAYS PROJECTS NETWORKING

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# BUILDING THE FUTURE TOGETHER: A CONVERSATION WITH NJ PATHWAYS PARTNERS

**John Harmon**

**Founder, CEO, and President,** African American Chamber of Commerce of NJ

**Dana Castro**

**Senior Director,** Healthcare Information and Management Systems Society

**Ashish D. Borgaonkar**

**Director, NCE Grand Challenges Scholars Program**

New Jersey Institute of Technology

**Joseph DeMarco**

**Director of Apprenticeship, Laborers International Union of North America**

New Jersey Construction Craft Laborer Apprenticeship Program

**Matthew Hale**

**Associate Professor and MPA Program Chair, Department of Political Science and Public Affairs, Seton Hall University**

President, New Jersey Big Data Alliance

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate:
## Pathways for All

# MICRO-PATHWAYS, MACRO IMPACT: REIMAGINING ACCESS, EQUITY, AND EMPLOYABILITY


**Rachel Kahn**

**Senior Director, Community College Growth Engine**

Education Design Lab



**Michael Macklin**

**Associate Vice Chancellor, Workforce Solutions**

Colorado Community College System

# Micro-Pathways, Macro Impact:

## *Reimagining Access, Equity, and Employability*

June 4, 2025

Education Design Lab

# Presenters

**Dr. Rachel Kahn**
*Senior Director,*
*Community College Growth Engine*
Education Design Lab

**Michael Macklin**
*Associate Vice Chancellor for Workforce Solutions,*
Colorado Community College System

# Agenda

- Welcome + Introductions
- The Lab + Community College Growth Engine Overview
- The Colorado Community College System + Behavioral Health
- Fireside Chat
- Wrap-up + Close

**Education** Design Lab

# Designing Education Toward the Future of Work

# Who We Are

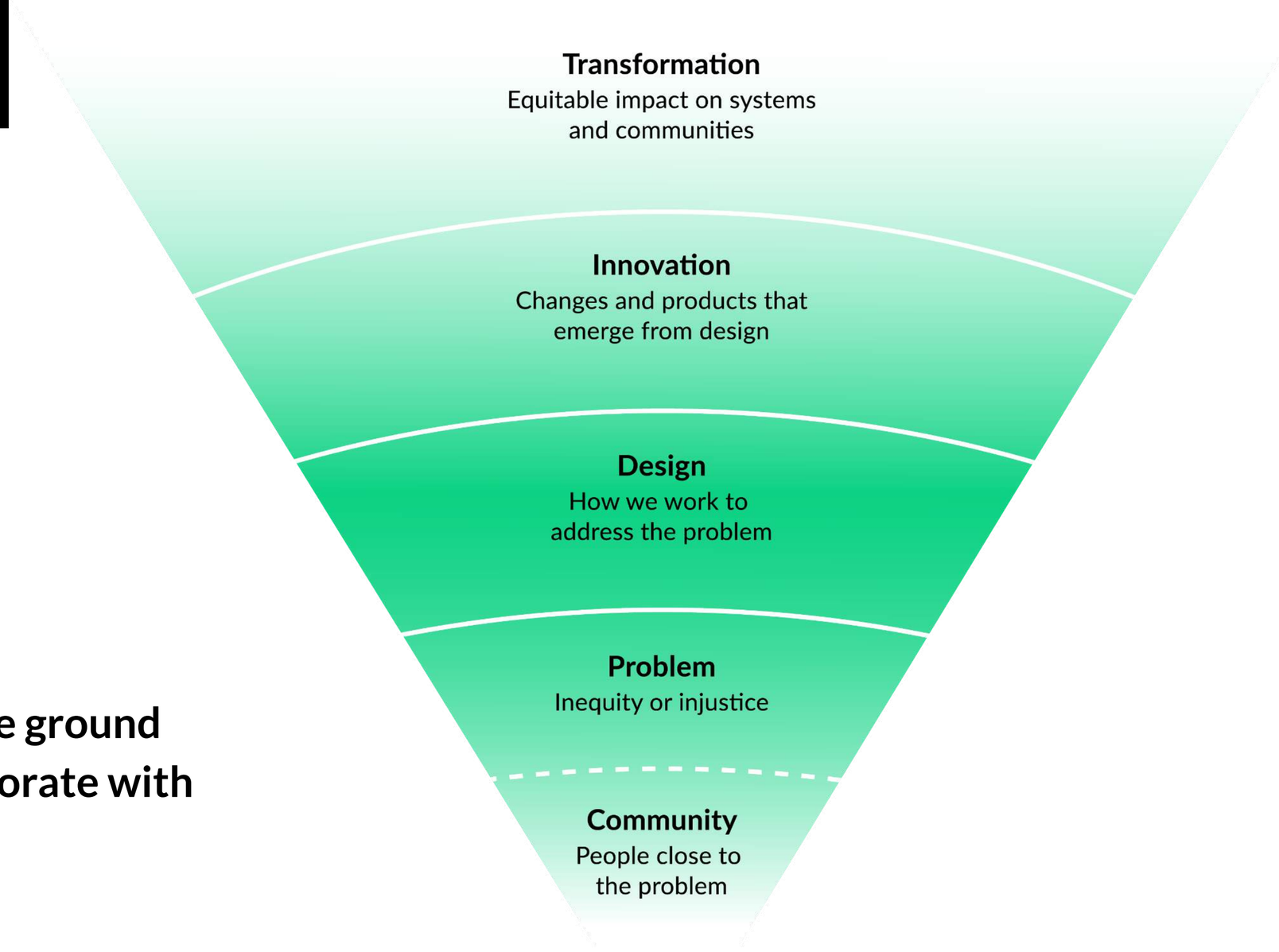
Education Design Lab (the Lab) is a 12-year old national nonprofit dedicated to driving the nation's shift towards an equitable skills-based economy.

Our mission is to…

**Co-design an inclusive skills-based learn+work system with and for New Majority Learner-Earners that facilitates upward economic mobility and closes opportunity gaps.**

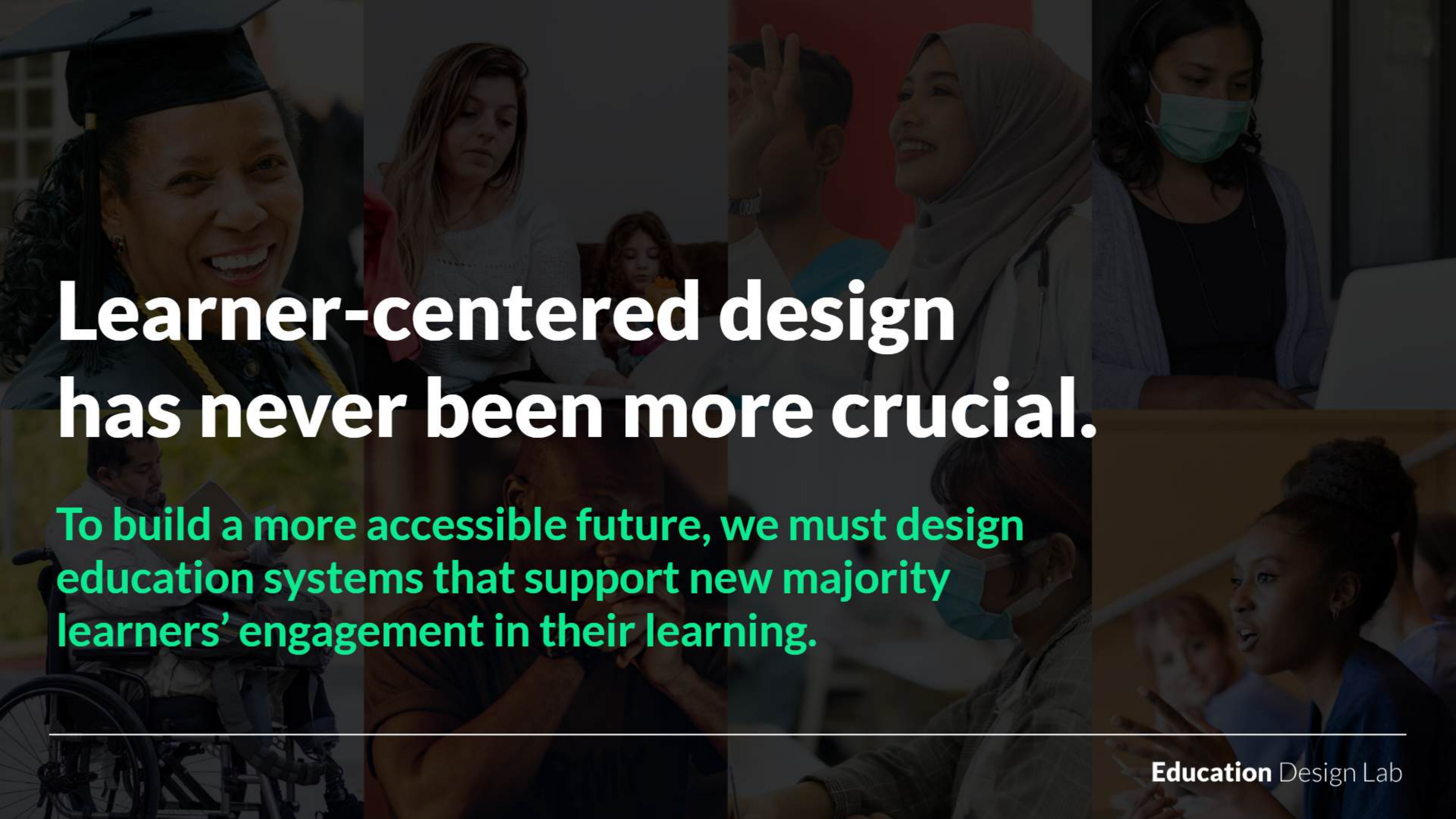
# Our Approach

## We use the power of design to transform how we learn + work.




**Transformation is only possible if we ground ourselves in the problem and collaborate with people closest to the problem.**

# Community College Growth Engine



# Learner-centered design has never been more crucial.

**To build a more accessible future, we must design education systems that support new majority learners' engagement in their learning.**

---

**Education** Design Lab

# Designing Postsecondary Education with Learners

**Who are the learners we primarily work with?**

Frontline Workers
Transfer Students
Single Parents
Non-degreed Adults
First-generation Students
Underinvested Communities



Community College Growth Engine

# About Us

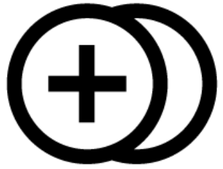

The Community College Growth Engine (CCGE) is a **design accelerator** hosted by Education Design Lab. The CCGE team supports community colleges in delivering **skills-focused, market-driven education, positioning them as regional talent agents that connect education to employment.** Our initiative addresses the urgent need for innovative solutions to close the growing skills gap.

**How might we design equitable and accessible micro-pathways toward high-growth careers endorsed by employers and visible to learners moving from post-secondary education into the workforce?**

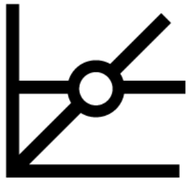
**Education** Design Lab

# Design Criteria

**In order to meet the needs of New Majority Learners and employers, micro-pathways must:**



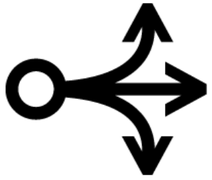
Include **two or more credentials** that are **stackable**, **portable**, + **track toward** a **degree**



**Align** to dynamic **regional labor market** employment + wage **data**

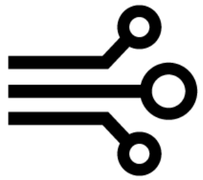
**Be employer-initiated** + **validated**


Be completed in **one year or less**



Be offered in a **flexible delivery format**

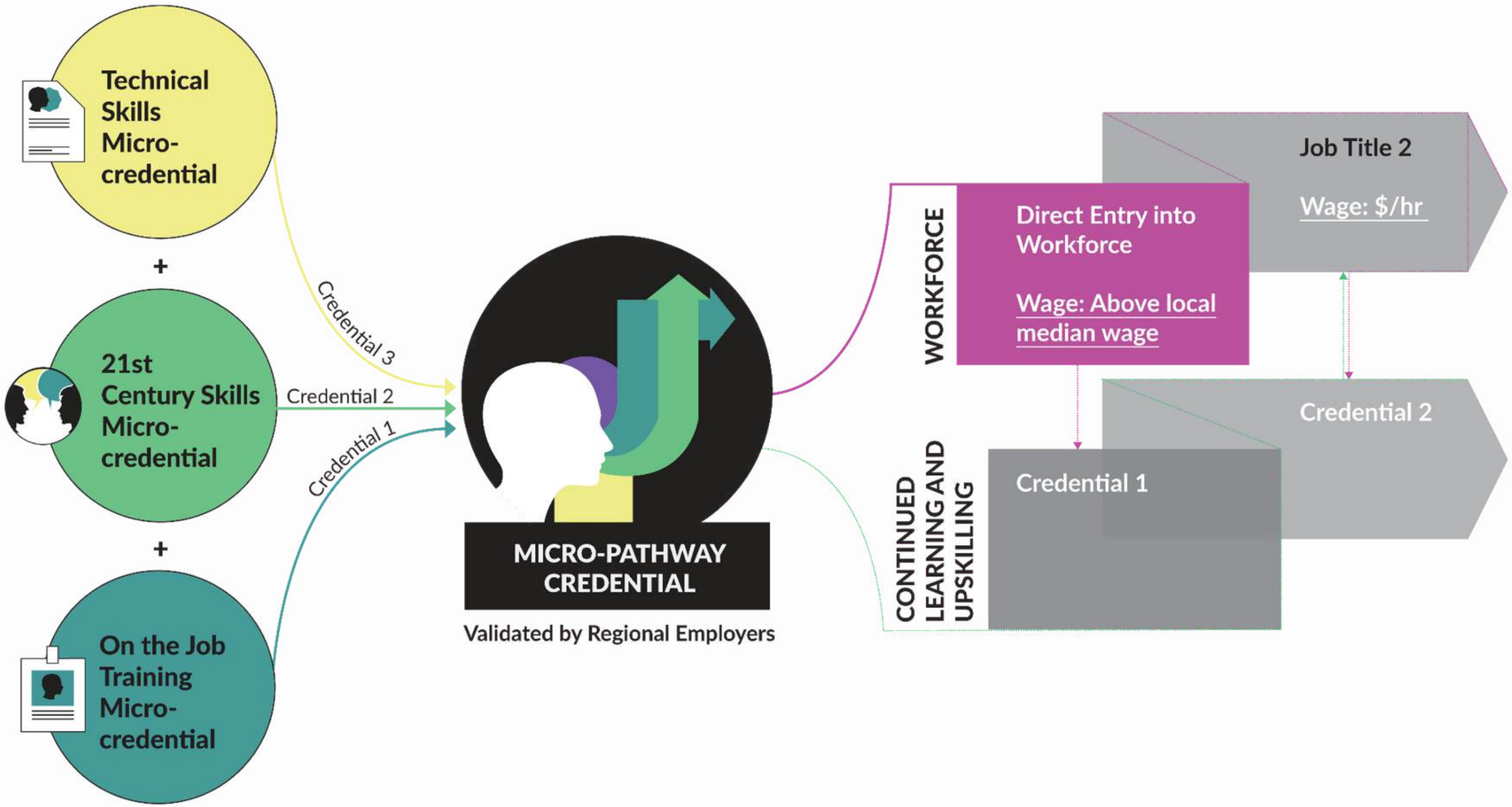
Be **affordable**



Be **digitally discoverable**

Integrate **technical + durable skills**

# Micro-Pathway Model



# Arc of Engagement

Community College Growth Engine

## Kick-Off + Foundations of Design

Learn + collaborate with micro-pathway practitioners, ecosystem map, and kick-off the cohort

Milestones:
- ❑ Develop Problem Statement
- ❑ Occupation Selection
- ❑ Learner Persona Development
- ❑ Ecosystem Mapping
- ❑ Communication Planning

Learnings Check-ins

## Understand

Deep dive into learner needs, employer needs, system processes and micro-pathway models

Milestones:
- ❑ Employer Engagement Planning + Implementation
- ❑ T-Profile Sessions
- ❑ Learner Persona Validation
- ❑ Learner Journey Mapping #1

Learnings Check-ins

## Design + Ideate

Evaluate and synergize learnings with faculty to develop curriculum

Milestones:
- ❑ Curriculum Mapping
- ❑ Micro-pathway prototype development
- ❑ Develop implementation strategy

Learnings Check-ins

## Prototype + Iterate

Build micro-pathway prototypes and validate with stakeholders

Milestones:
- ❑ Validate with Employers
- ❑ Validate with Learners
- ❑ Learner Journey Mapping #2
- ❑ Develop + Implement Marketing Plan
- ❑ Cost + Funding Planning

Learnings Check-ins

## Pilot Launch

Learnings Check-ins

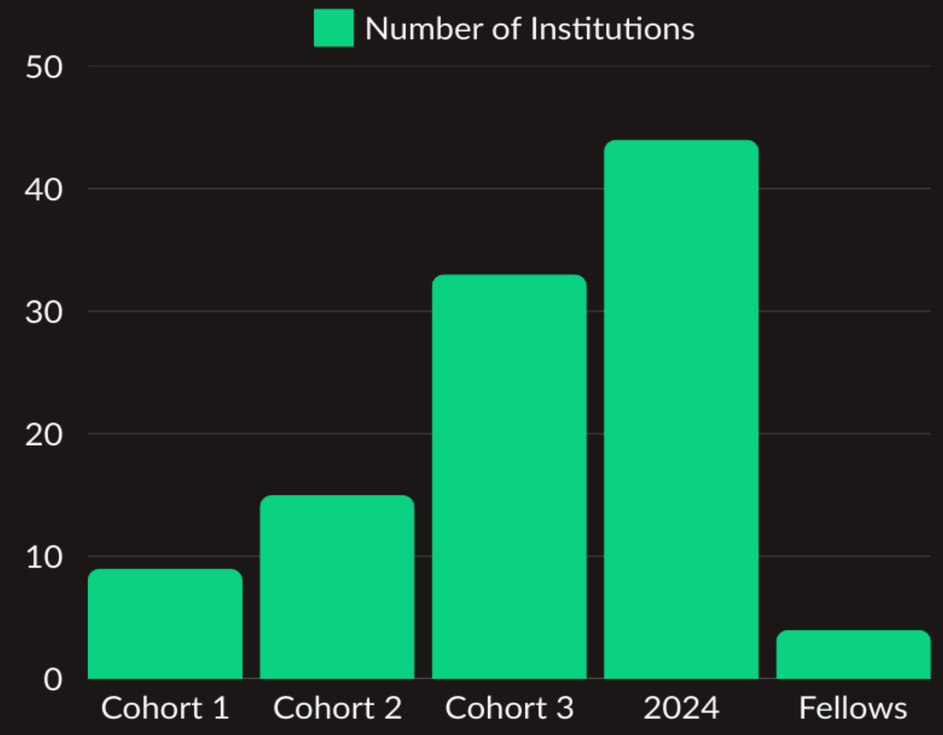
## Continual Pilot Implementation

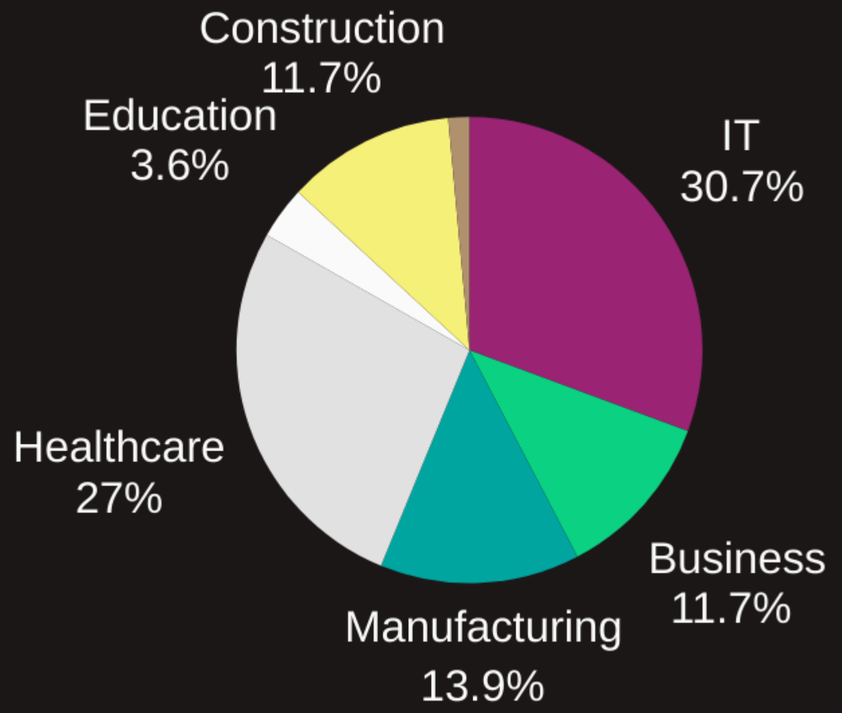
Impact Evaluation, Data Infrastructure & Development

Education Design Lab

# CCGE Impact: By the Numbers

Community College Growth Engine

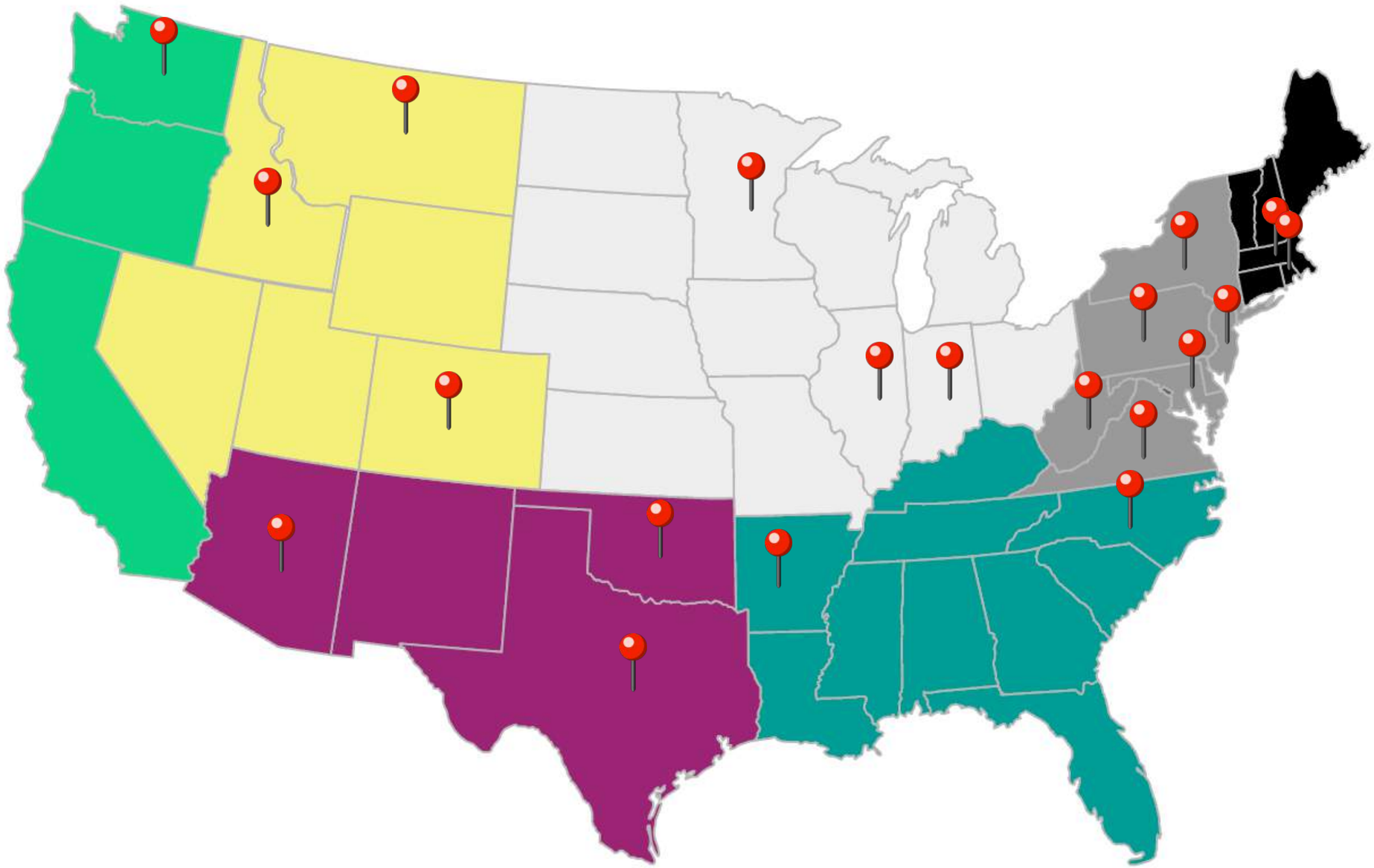



Since the 2021 launch of the Community College Growth Engine (CCGE), the Lab has worked with over **100+ colleges** and systems nationwide to design, launch and develop more than **211 employer-validated micro-pathways** across **seven sectors**, covering more than **111 occupations** that connect New Majority Learners to employment in careers at or above median wage helping to bridge the gap between education and workforce demand.

# A National Movement with Regional Impact

Community College Growth Engine



- Rocky Mount: 23 Colleges
- Midwest: 11 Colleges
- New England: 3 Colleges
- Mid-Atlantic: 18 Colleges
- Southeast: 27 Colleges
- Southwest: 16 Colleges
- Pacific: 3 Colleges

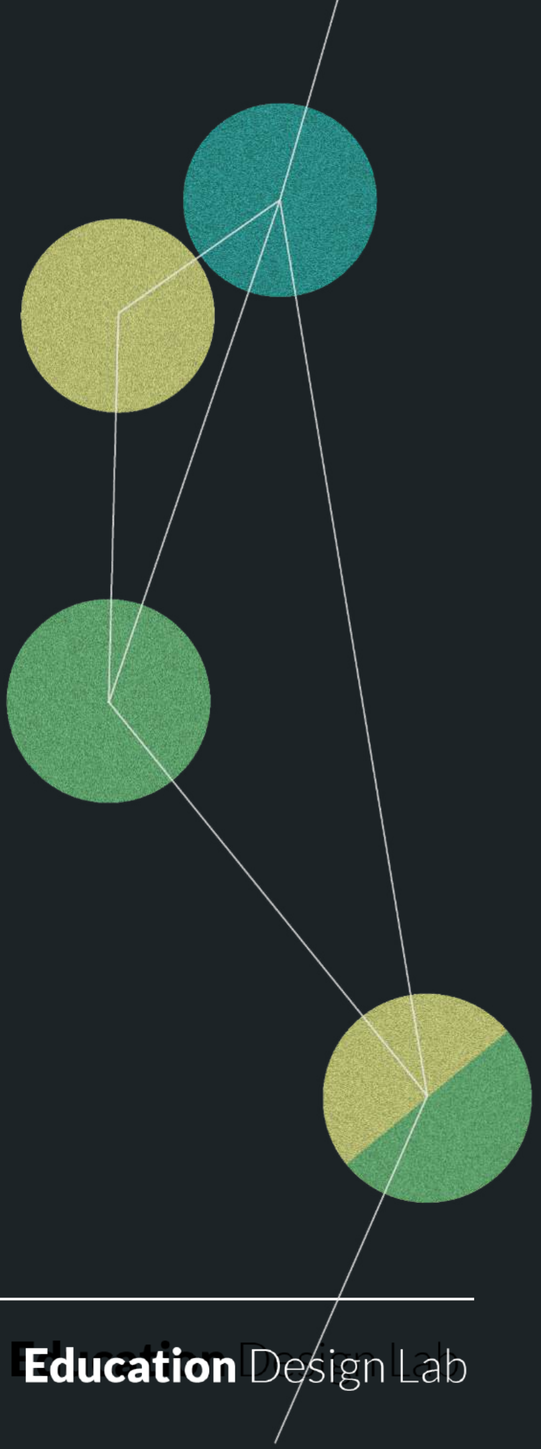
# We've learned…

Designing micro-pathways can serve as a "gateway" for community college transformation through:

- Stackable Program Design
- Employer Engagement
- Marketing to New Majority Learners
- Noncredit to Credit Alignment
- Data Collection

***This kind of institution-wide transformation must be driven by senior leadership.***

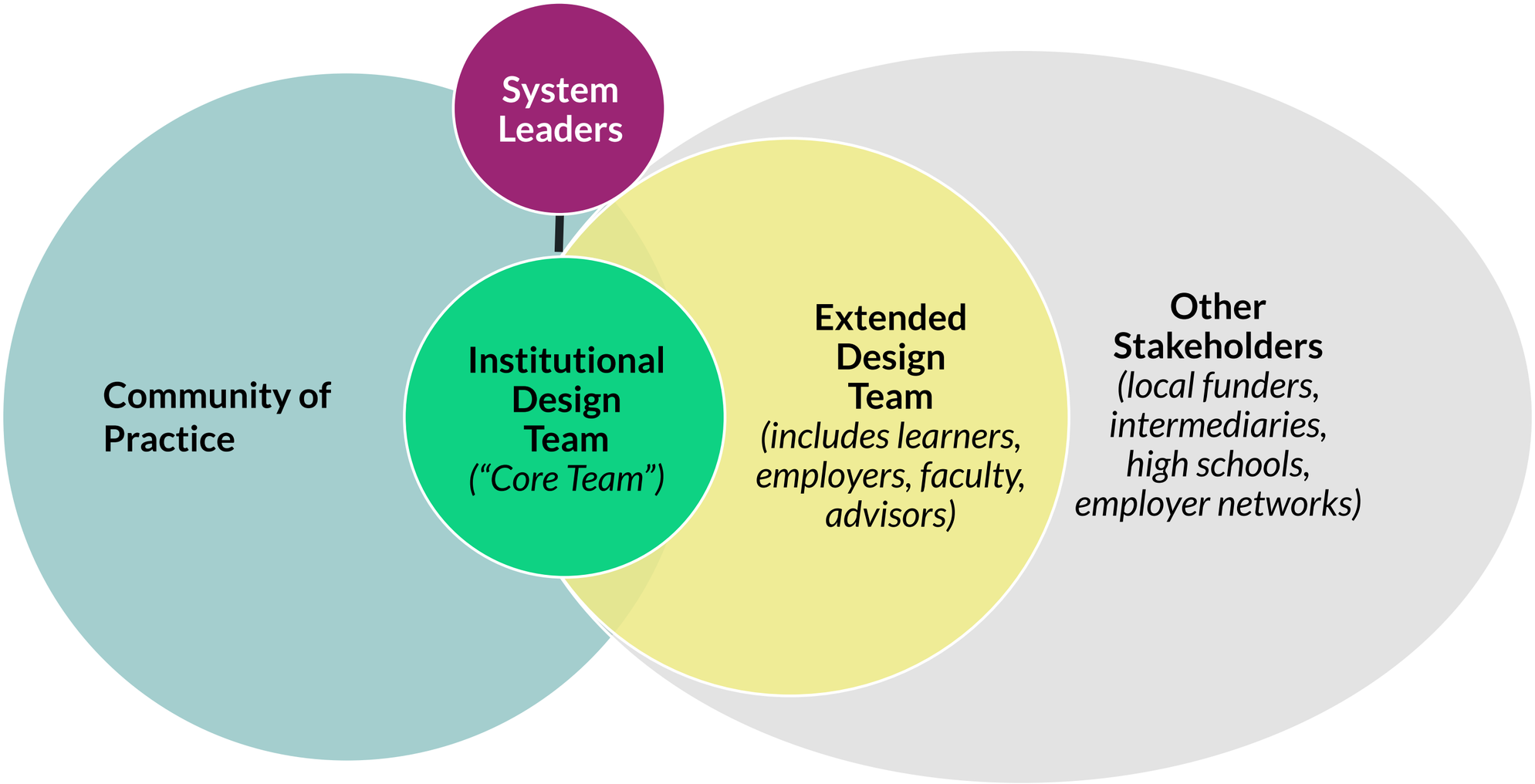
# Developing an Effective Design Team



# What is a Design Team?

- **A group of people dedicated to the outcomes of this work**
- **Committed to this work for the first year, and beyond**
- **Includes multiple stakeholder groups *(i.e.-College leaders, faculty, staff, learners, external partners)***
- **Provide diverse perspectives and expertise**

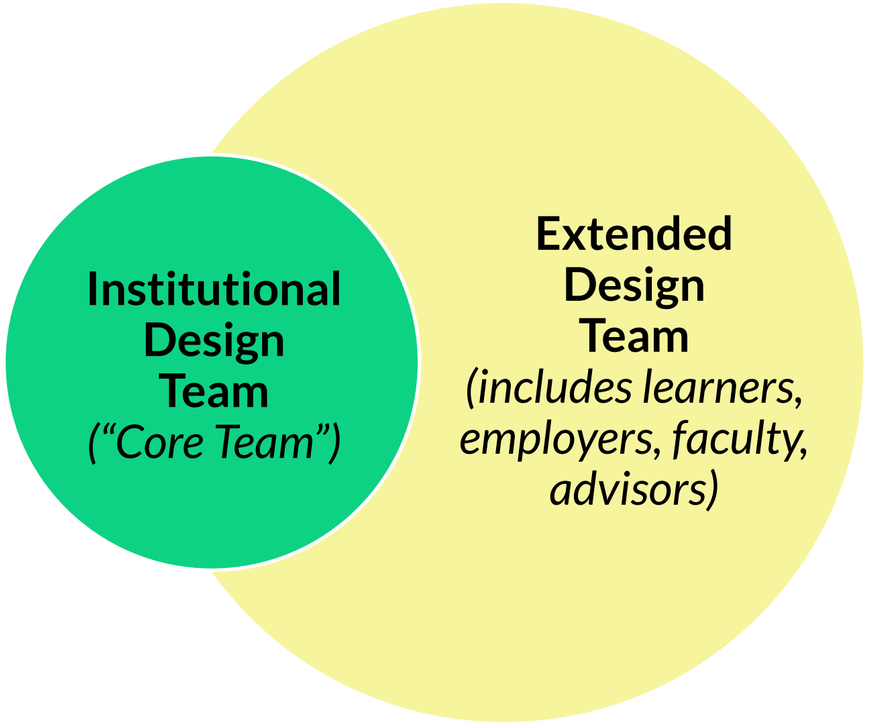
# Design Team Structure



# Potential Design Team Members

While the specific makeup of the teams will vary from institution to institution, each institutional design teams and codesign partners typically consist of the following participants throughout the design process.

- Design Lead/Workforce Representative
- Data Lead/ IT Representative
- Academic Representation from Program Areas/Industries selected
- Diversity, Equity, Inclusion, and Belonging
- Research + Evaluation
- Student Services + Supports
- Employer Partnerships/Business Development
- Senior Leadership
- Financial aid + college foundation
- Learner co-designers
- Employer Partners
- K-12 Partners




***Other key strategic partners may be brought into select sessions as necessary***

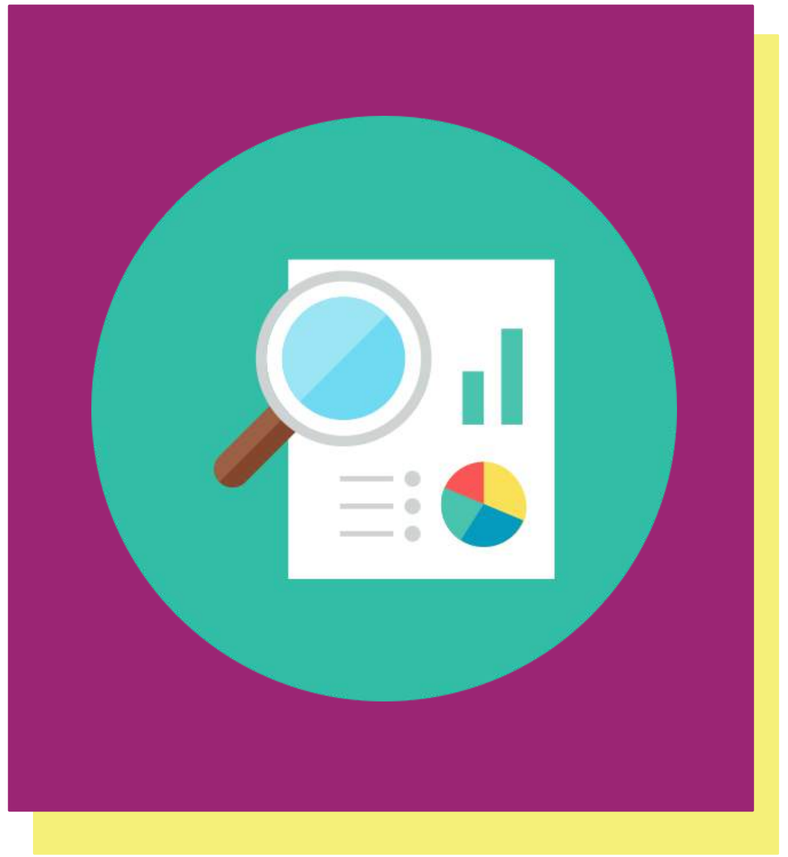
***(e.g. marketing, advising, financial services, communications, etc.)***

# The Design Team Lead

- 1 Design Lead per team
- Serves as point-of-contact and liaison for this work
- Centers equity and learners in your work
- Does not need to be a SME in the industries the team is focused on
- Move/remove barriers for the team both internally and externally
- Collaborate with the Lab Team

# The Data Lead

- 1 Data Lead per team
- Serves as point-of-contact data-related components of this work
- Helps the team understand how data is collected, managed, stored, distributed within the institution and/ or system
- Does not need to be a part of every design session
- Collaborates with the Lab Team



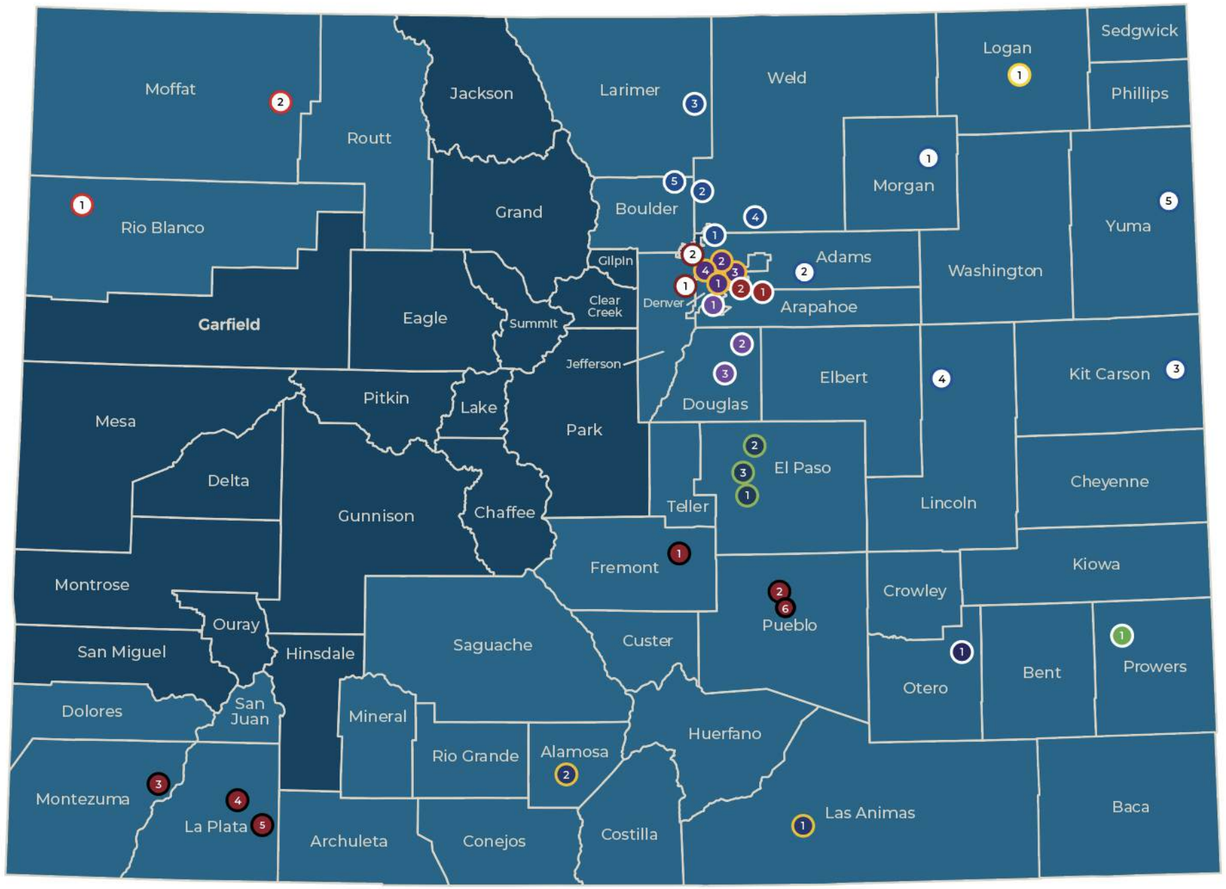

*Together,*
WE WILL.
COLORADO
COMMUNITY COLLEGE SYSTEM
www.cccs.edu

# STRATEGIC ALIGNMENT

- Economic Mobility
- Education for All
- Empowered Talent
- Partner of Choice
- The Power of 13

COLORADO
COMMUNITY COLLEGE SYSTEM

# *13 Colleges. 35 Locations. Online Everywhere.*




**ARAPAHOE COMMUNITY COLLEGE**
1. LITTLETON CAMPUS
2. LEGACY CAMPUS
3. CASTLE ROCK - STURM

**COLORADO NORTHWESTERN COMMUNITY COLLEGE**
1. RANGELY CAMPUS
2. CRAIG CAMPUS

**COMMUNITY COLLEGE OF AURORA**
1. CENTRETECH CAMPUS
2. LOWRY CAMPUS

**COMMUNITY COLLEGE OF DENVER**
1. CENTRETECH CAMPUS
2. LOWRY CAMPUS
3. LOWRY CAMPUS
4. CEC EARLY COLLEGE

**FRONT RANGE COMMUNITY COLLEGE**
1. WESTMINSTER CAMPUS
2. BOULDER COUNTY CAMPUS
3. LARIMER CAMPUS
4. CENTER FOR INTEGRATED MANUFACTURING

**LAMAR COMMUNITY COLLEGE**
1. LAMAR CAMPUS

**MORGAN COMMUNITY COLLEGE**
1. FORT MORGAN CAMPUS
2. BENNET CENTER
3. BURLINGTON CENTER
4. LIMON CENTER
5. WRAY CENTER

**NORTHEASTERN JUNIOR COLLEGE**
1. STERLING CAMPUS

**OTERO COMMUNITY COLLEGE**
1. LA JUNTA CAMPUS

**OTERO COLLEGE**
1. LA JUNTA CAMPUS

**PIKES PEAK STATE COLLEGE**
1. CENTENNIAL CAMPUS
2. RAMPART RANGE CAMPUS
3. DOWNTOWN STUDIO CAMPUS

**PUEBLO COMMUNITY COLLEGE**
1. PUEBLO CAMPUS
2. FREMONT CAMPUS
3. MANCOS CAMPUS
4. DURANGO SITE
5. BAYFIELD SITE
6. NURSING AND ALLIED HEALTH TLC

**RED ROCKS COMMUNITY COLLEGE**
1. LAKEWOOD CAMPUS
2. ARVADA CAMPUS

**TRINIDAD STATE COLLEGE**
1. TRINIDAD CAMPUS
2. VALLEY CAMPUS

**GOAL:**

**Increase and diversify behavioral healthcare workforce**

### Supporting Services

- Healthy Students = Strong Students
- Clinical Opportunities

### Academic Pathways

- Focus on Stackability
- Limited Options
- High Demand
- Employer Partners

### Funding and Partners

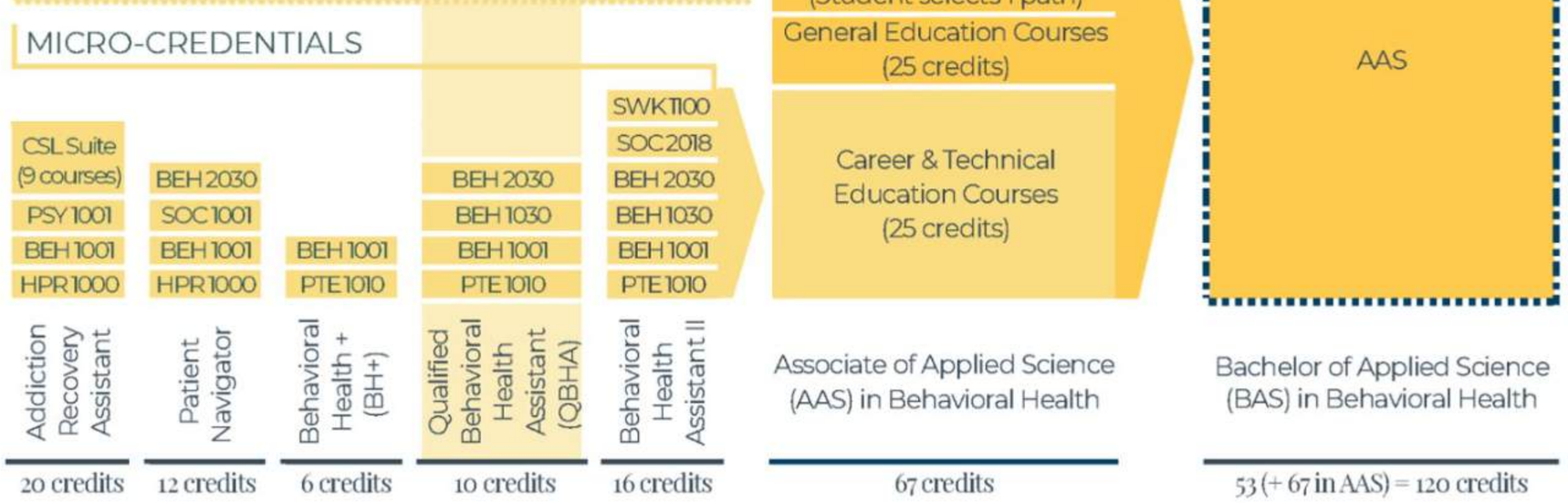
- SB22-181 Behavioral Health Career Pathways
- Education Design Lab
- Multiple Consultants

# Behavioral Health Pathways: **Stackability**

A pathway is "stackable" when smaller curricula (micro-credentials) build into each other and into larger degrees, allowing for shorter-term gains toward longer-term goals. Take a look at the building-block style of CCCS's stackable Behavioral Health coursework represented here, noticing how micro-credential coursework fits into Associate and then Bachelor of Applied Science degrees. Stackability allows students to continue credentialed learning in small, bite-size steps toward greater qualifications!

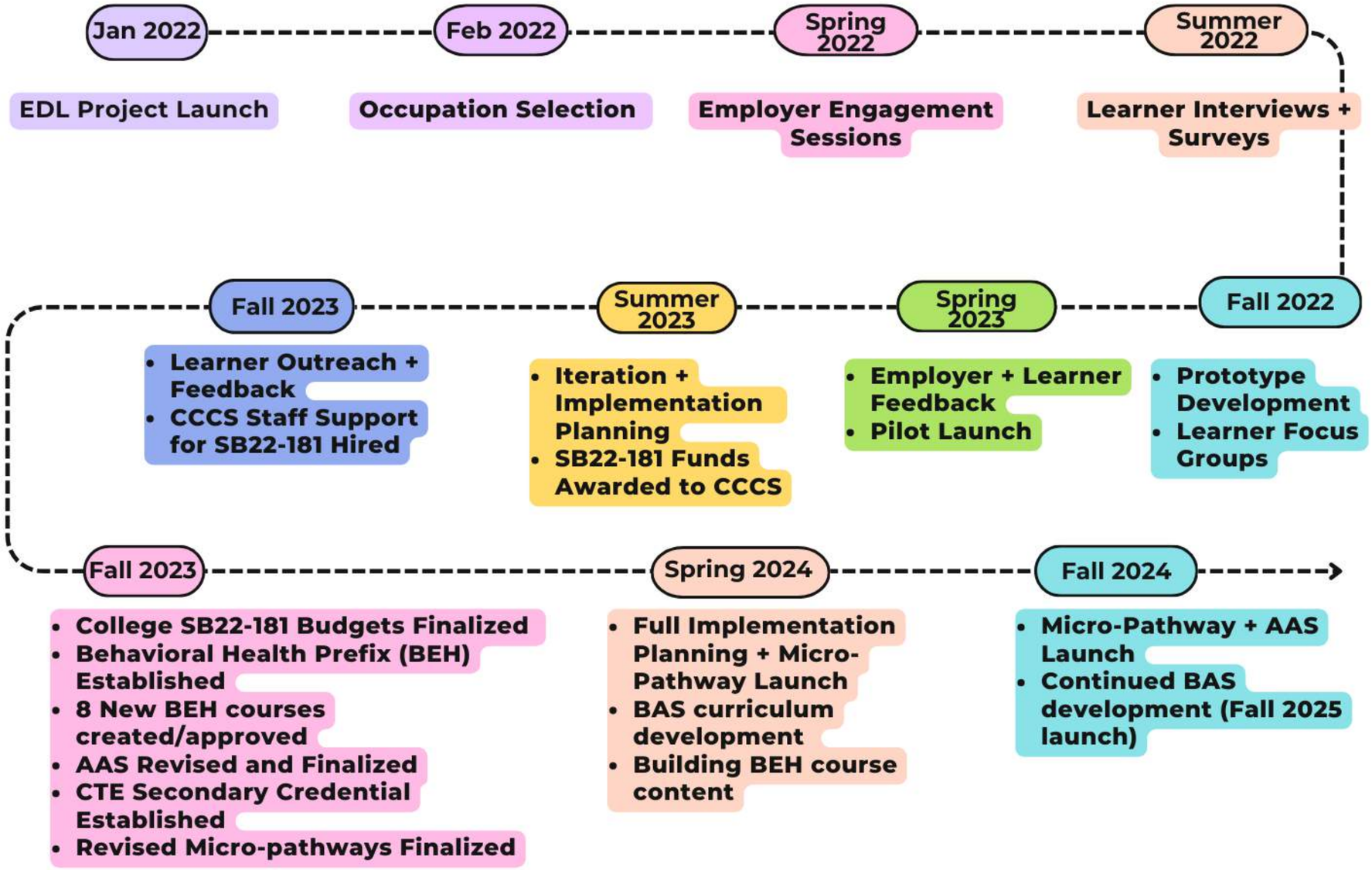
### Qualified Behavioral Health Assistant (QBHA) Bootcamp

- Self-paced, non-credit training designed in coordination with the Behavioral Health Administration (BHA) for current Behavioral Health professionals seeking to become QBHAs.
- Assesses competency demonstration from 4-courses included in the QBHA micro-credential, as well as upskilling opportunities.
- Successful completers will be QBHAs and therefore eligible to serve as part of a Medicaid reimbursed care team.
- Bootcamp completion may be leveraged as Credit for Prior Learning (CPL) at your local community college.



# Timeline

# Behavioral Health Project Timeline



# “If you want to go fast, go alone. If you want to go far, go together.”

## CCCS Workforce Solutions

- BEH Leadership Team
- Education Design Lab
- Curriculum Team
- Communications Team
- Strategic Partners

COLORADO
COMMUNITY COLLEGE SYSTEM

# Academic Programs

Micro-credentials

to

Bachelor of Applied Science

Micro-credential Certificates

- Behavioral Health +
- Qualified Behavioral Health Assistant - QBHA
- Behavioral Health Assistant II
- Addiction Recovery Assistant
- Patient Navigator

Degrees

- Associate of Applied Science
  - **Addiction Recovery**
  - **Mental Health and Social Work**
- Bachelor of Applied Science
  - **Addiction Recovery**
  - **Mental Health and Wellbeing**

# Colorado Community College System
# Behavioral Health Assistant - Qualified BHA

## A Micro-Pathway to Become a Behavioral Health Assistant

COLORADO COMMUNITY COLLEGE SYSTEM

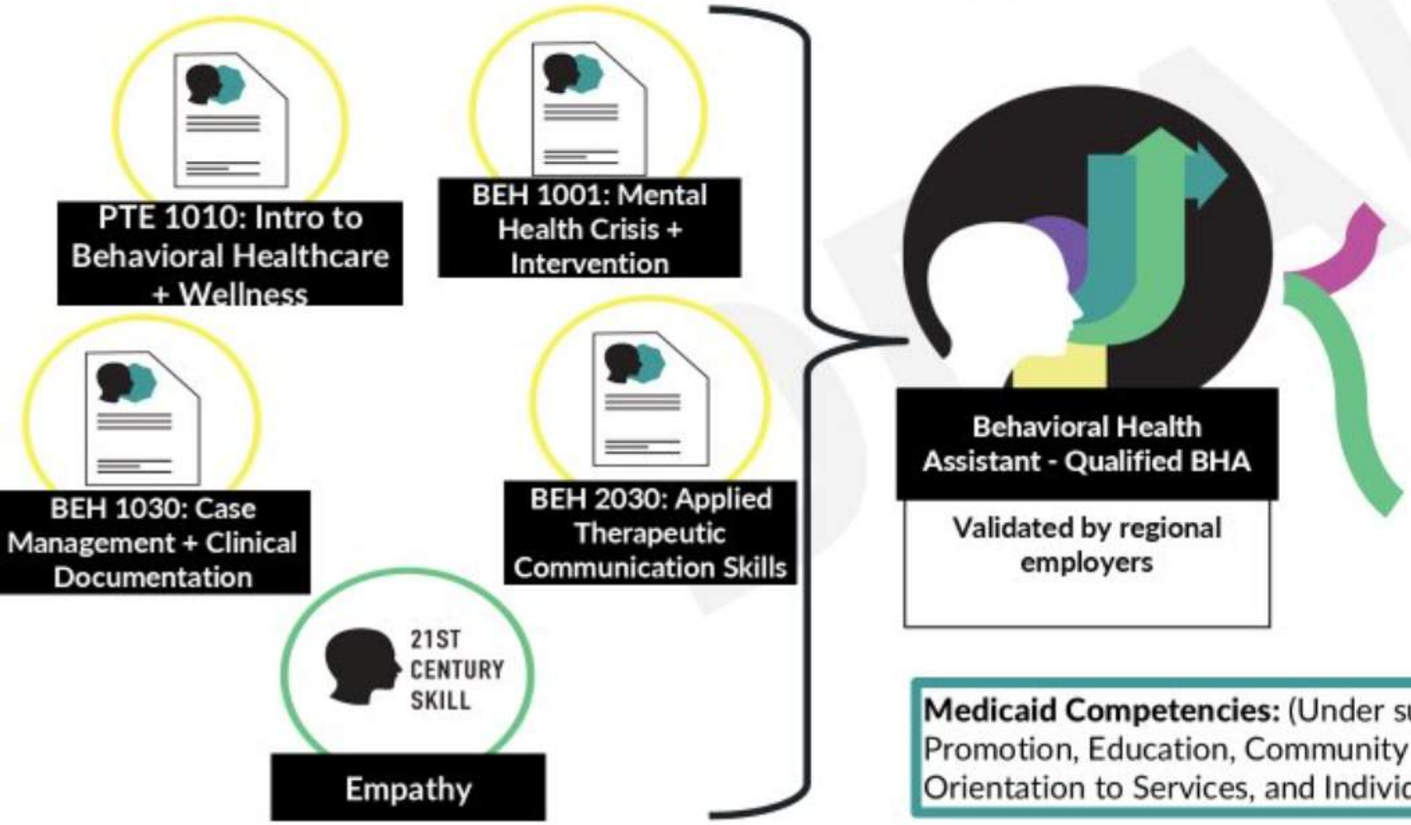
**SUMMARY:** The *Qualified Behavioral Health Assistant* micro-credential ensures students develop entry-level behavioral health knowledge and competencies. Upon completion of this coursework, they will be a Qualified Behavioral Health Assistant as outlined by the Behavioral Health Administration. The curriculum includes entry-level skills and foundational knowledge about behavioral health and wellness, intercultural competency, therapeutic communication, case management, and crisis intervention.

**TOP SKILLS:**

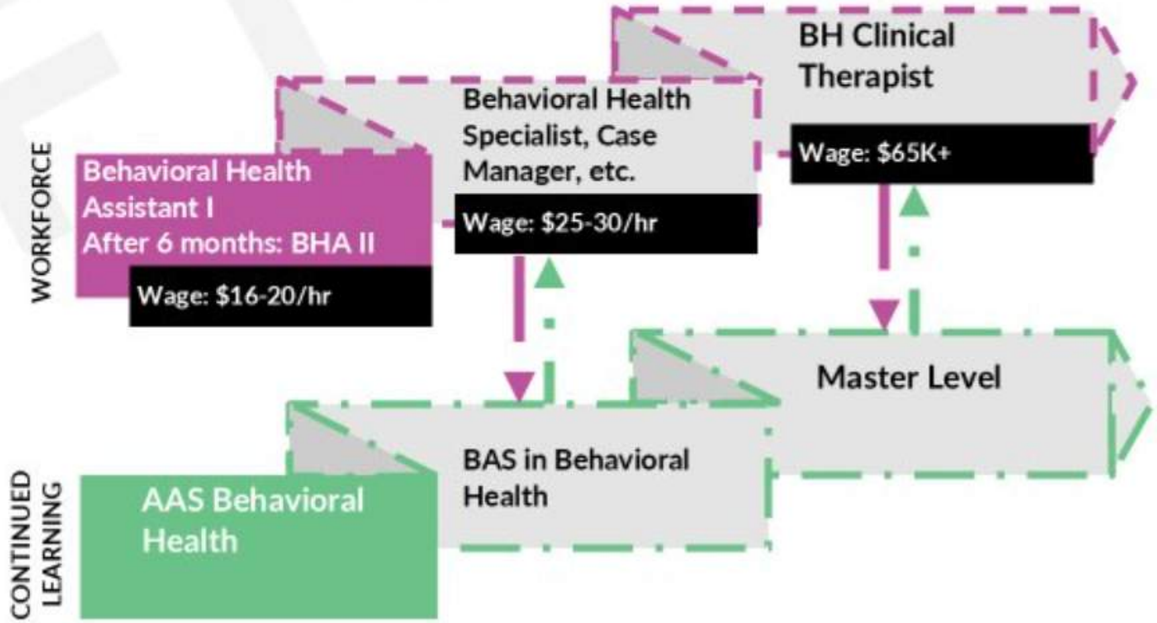
1. Understanding of Behavioral Health and Healthcare Systems
2. Empathy and Healthy Boundaries
3. Therapeutic Communication Skills
4. Case Management and Documentation
5. Crisis Intervention and Wellness
6. Trauma-Informed Care and Cultural Competency

**CREDENTIALS EARNED**

**6 months | 10 Credits towards higher credential | Hybrid**




**FUTURE GROWTH OPPORTUNITIES**




**Medicaid Competencies:** (Under supervision), these individuals will be able to do elements of: Wellness Promotion, Education, Community Needs Assessment, Screening, Referral, Crisis Management, Case Management, Orientation to Services, and Individual & Group Interventions

# Behavioral Health Pathways: **Stackability**

A pathway is "stackable" when smaller curricula (micro-credentials) build into each other and into larger degrees, allowing for shorter-term gains toward longer-term goals. Take a look at the building-block style of CCCS's stackable Behavioral Health coursework represented here, noticing how micro-credential coursework fits into Associate and then Bachelor of Applied Science degrees. Stackability allows students to continue credentialed learning in small, bite-size steps toward greater qualifications!

### Qualified Behavioral Health Assistant (QBHA) Bootcamp

- Self-paced, non-credit training designed in coordination with the Behavioral Health Administration (BHA) for current Behavioral Health professionals seeking to become QBHAs.
- Assesses competency demonstration from 4-courses included in the QBHA micro-credential, as well as upskilling opportunities.
- Successful completers will be QBHAs and therefore eligible to serve as part of a Medicaid reimbursed care team.
- Bootcamp completion may be leveraged as Credit for Prior Learning (CPL) at your local community college.

## MICRO-CREDENTIALS

| Addiction Recovery Assistant | Patient Navigator | Behavioral Health + (BH+) | Qualified Behavioral Health Assistant (QBHA) | Behavioral Health Assistant II |
|---|---|---|---|---|
| CSL Suite (9 courses) | BEH 2030 | | BEH 2030 | SWK 1100 |
| PSY 1001 | SOC 1001 | | BEH 1030 | SOC 2018 |
| BEH 1001 | BEH 1001 | BEH 1001 | BEH 1001 | BEH 2030 |
| HPR 1000 | HPR 1000 | PTE 1010 | PTE 1010 | BEH 1030 |
| | | | | BEH 1001 |
| | | | | PTE 1010 |
| 20 credits | 12 credits | 6 credits | 10 credits | 16 credits |

## ASSOCIATE OF APPLIED SCIENCE

Mental Health & Social Work (17 credits) | Addiction Recovery (17 credits)

Emphasis Courses (Student selects 1 path)

General Education Courses (25 credits)

Career & Technical Education Courses (25 credits)

Associate of Applied Science (AAS) in Behavioral Health

67 credits

## BACHELOR OF APPLIED SCIENCE

Mental Health & Wellness (15 credits) | Addiction Recovery (15 credits)

Emphasis Courses (Student selects 1 path)

General Education Courses (21 credits)

Career & Technical Education Courses (17 credits)

AAS

Bachelor of Applied Science (BAS) in Behavioral Health

53 (+ 67 in AAS) = 120 credits

# Support Services

## Secondary CTE Behavioral Health Credential

## $1.3M in philanthropic funding for scholarships

The secondary credential enables instructors to offer the Qualified Behavioral Health Assistant courses at the secondary level. The instructor's ability to offer concurrent enrollment will be limited to the 4 QBHA courses as long as the instructor and courses are connected to an approved secondary CTE program.

PTE 1010,BEH 1001, BEH 1030, and BEH 2030

*Additional concurrent enrollment courses can be included in this pathway as long as the instructor has the appropriate qualifications to offer additional courses that align with the connected AAS.

# Supportive Services

## Counselor Responsibilities

Counselor Service Provision: **3-Pronged Approach**

- Individual Counseling
- Group Counseling
- Psychoeducation & Outreach

# Collective Reach: AY 23-24

175: students received individual services

748: individual sessions

1000s: students received group/team/ campus-wide programming

# 30,000-Foot View

**This approach:**

- Exposes students to the behavioral health field as **client** and potentially as **entry-level practitioner** (psychoeducation intern); advocates for student involvement in the mental/behavioral health field, increasing interest in mental/behavioral health services, curricula, & careers
- Creates inherent program sustainability by moving institutions toward "career pathway and Behavioral Health Administration training alignment"
- Supports retention goals; **healthy humans = engaged & invested students!**
- Appeals to incoming students (& their parents!)
- Increases rural community pool of qualified mental/behavioral health providers & practitioners
- Offers opportunities for mutually beneficial partnerships with local industries, agencies, institutions, & practices

# Want to learn more?

*Enroll in the CCGE Micro-Pathway Micro-Credential*



https://bit.ly/CCGE-Micro-credential

Education Design Lab

COLORADO
COMMUNITY COLLEGE SYSTEM

# Fireside Chat Q&A

Education Design Lab

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# Contact Us

**Dr. Rachel Kahn**
*Senior Director, Community College Growth Engine*
Education Design Lab
**Email: rkahn@eddesignlab.org**

**Michael Macklin**
*Associate Vice Chancellor for Workforce Solutions*
Colorado Community College System
**Email: michael.macklin@cccs.edu**

COLORADO
COMMUNITY COLLEGE SYSTEM

Education Design Lab

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# BRIDGING BUSINESS AND EDUCATION: BUILDING INCLUSIVE PATHWAYS FOR ECONOMIC GROWTH

**Jennifer Thornton**

**Senior Vice President and Chief Program Officer**

Business-Higher Education Forum

# Bridging Business and Education: Building Inclusive Pathways for Economic Growth

New Jersey Pathways to Career Opportunities Summit
June 4, 2025
Jennifer Thornton, Senior Vice President and Chief Program Officer, Business-Higher Education Forum

The Business-Higher Education Forum is a national network connecting pioneering corporate and higher education leaders to identify emerging skills and co-develop pathways that address talent gaps.

## Our mission is to build the inclusive higher education paths that align to the workforce of future

**We focus on three goals critical for economic mobility & competitiveness:**

- ***Increase the number of learners/ earners completing with high-value skills, credentials aligned to employer needs***
- ***Expand access and adoption of work-integrated learning models that inclusively connect and prepare talent***
- ***Scale and implement with regional networks and leaders***

# BHEF works with partners to anticipate and build effective pathways across higher education and work

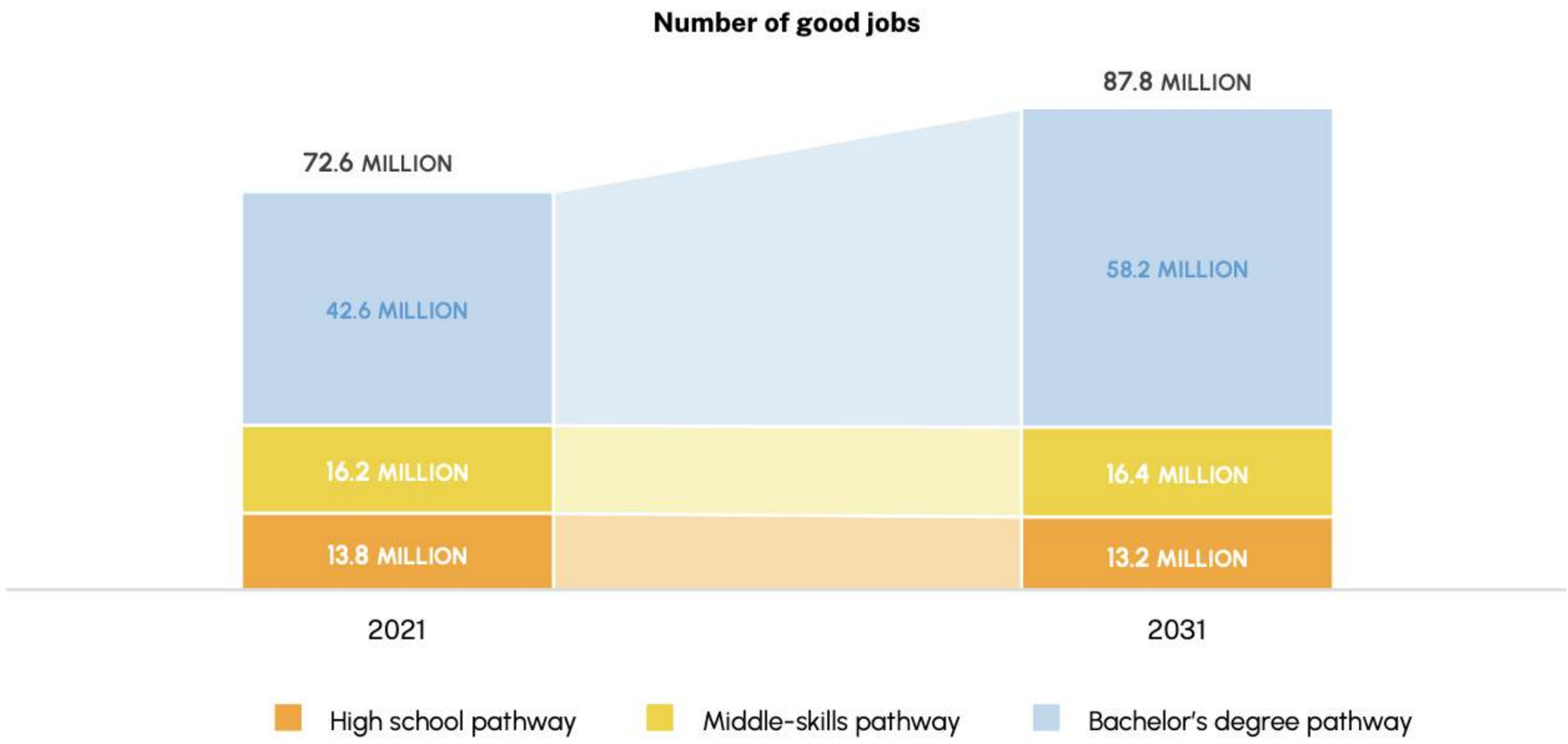
# Competing dynamics

| | |
|---|---|
| **13% ⬇** | Projected decline in high school graduates between 2025 and 2041 |
| **36%** | Americans who say they have confidence in U.S. higher education. |
| **26.7% ⬇** | Decrease in community college enrollment since it peak in 2010-2011 |
| **60%** | Estimated percent of the workforce that will need to reskill in next 3 years. |
| **62%** | Business leaders who say they it is a challenge to find and equip talent with the skills needed for today's workplace |
| **89%** | Of businesses who say that partnership with higher education is a priority |



*Sources: WICHE; Strada Education Network; Georgetown University Center for Education & Workforce; Gallup; Admissionsly and IPEDS*

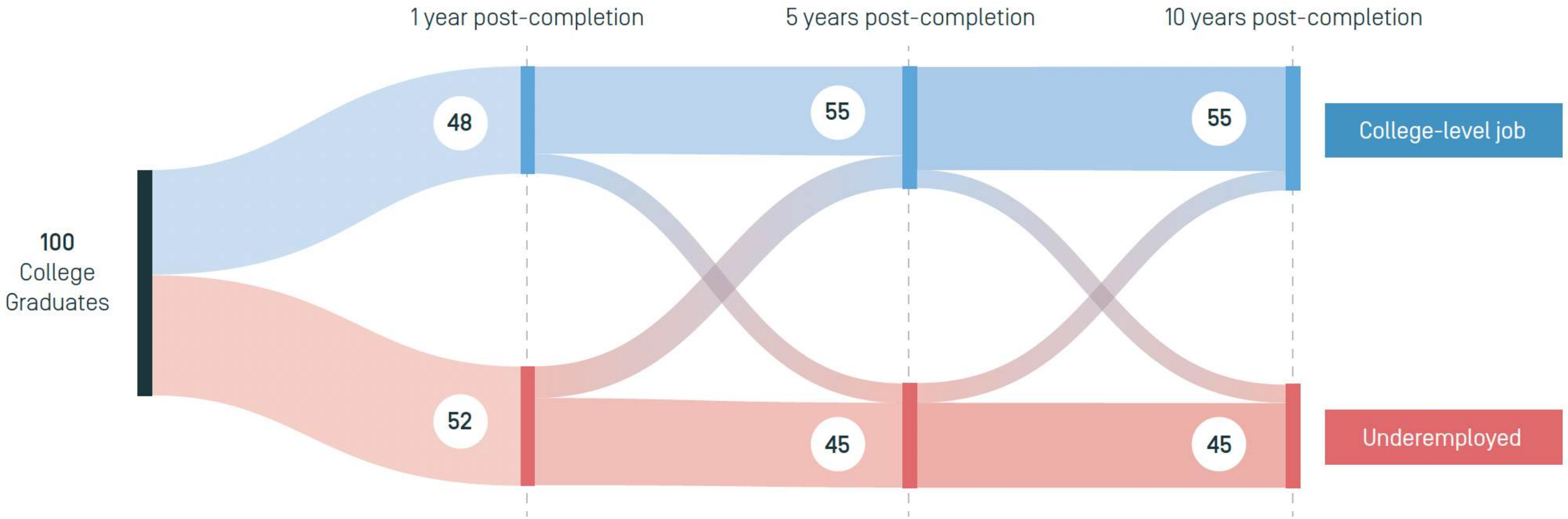
# Undergraduate credentials unlock “good jobs” of future





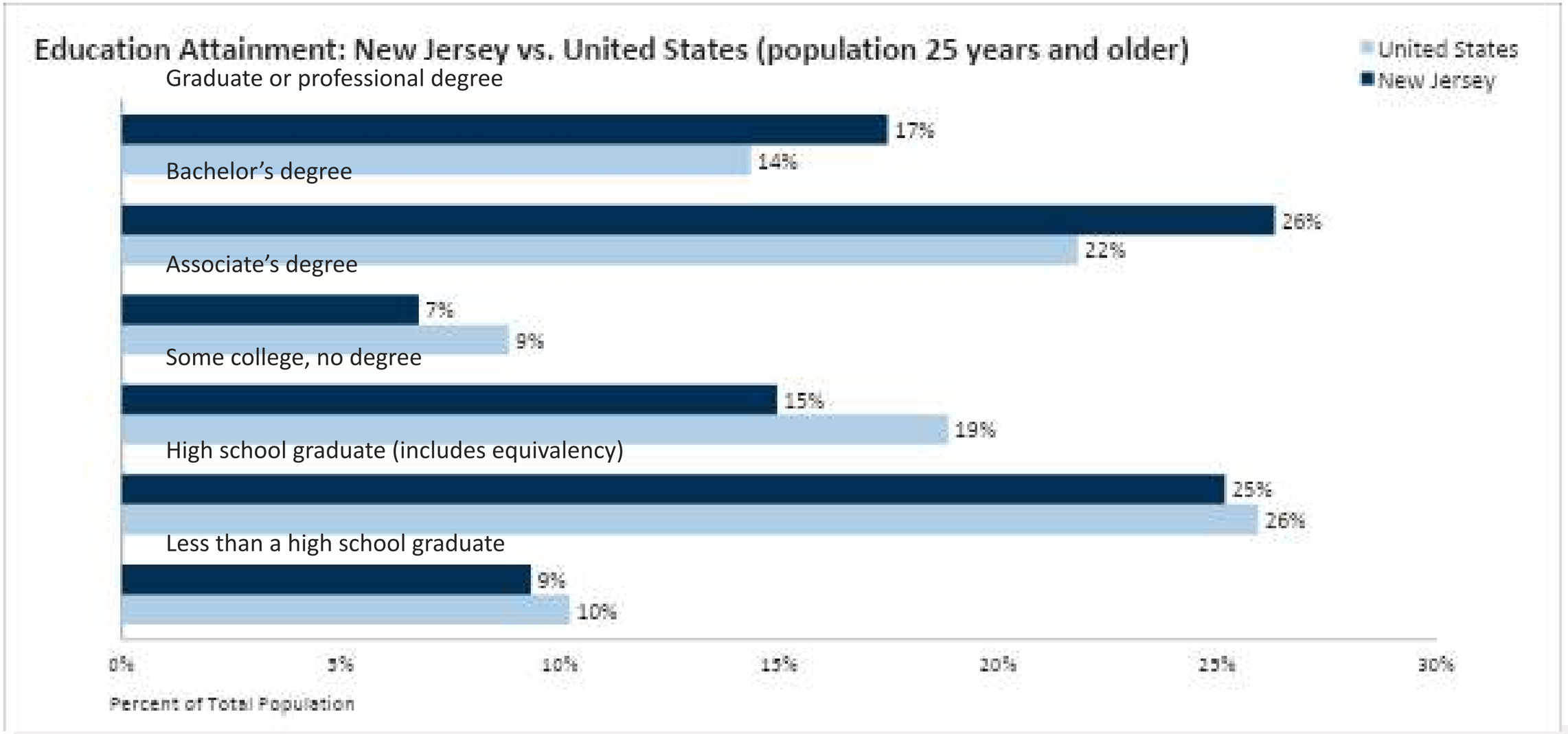

*Sources: Georgetown University Center for Education & Workforce*

# Yet, as a sector, higher education has delivered mixed outcomes



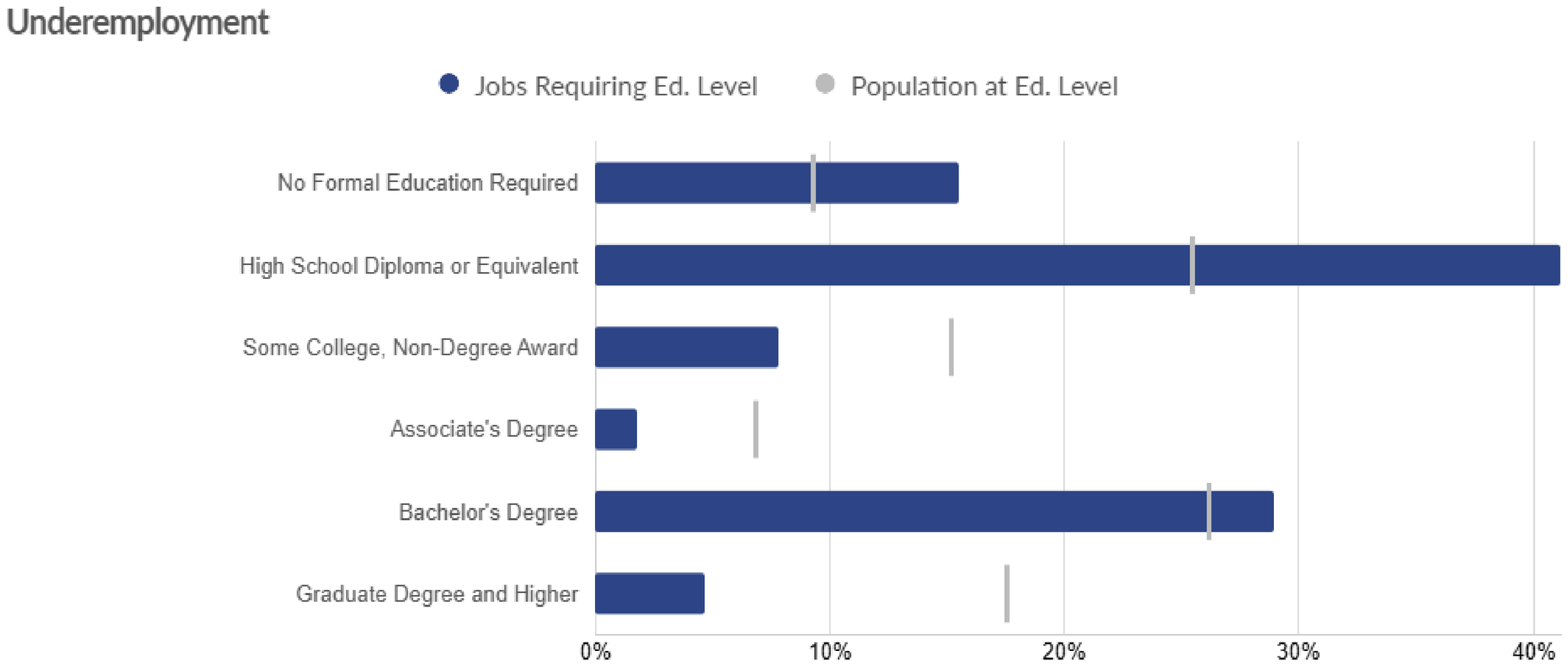

*Sources: Strada Education Foundation, Talent Disrupted*

# Among adults 25+, New Jersey exceeds the national average in bachelor and graduate degree attainment




*Source: U.S Census*

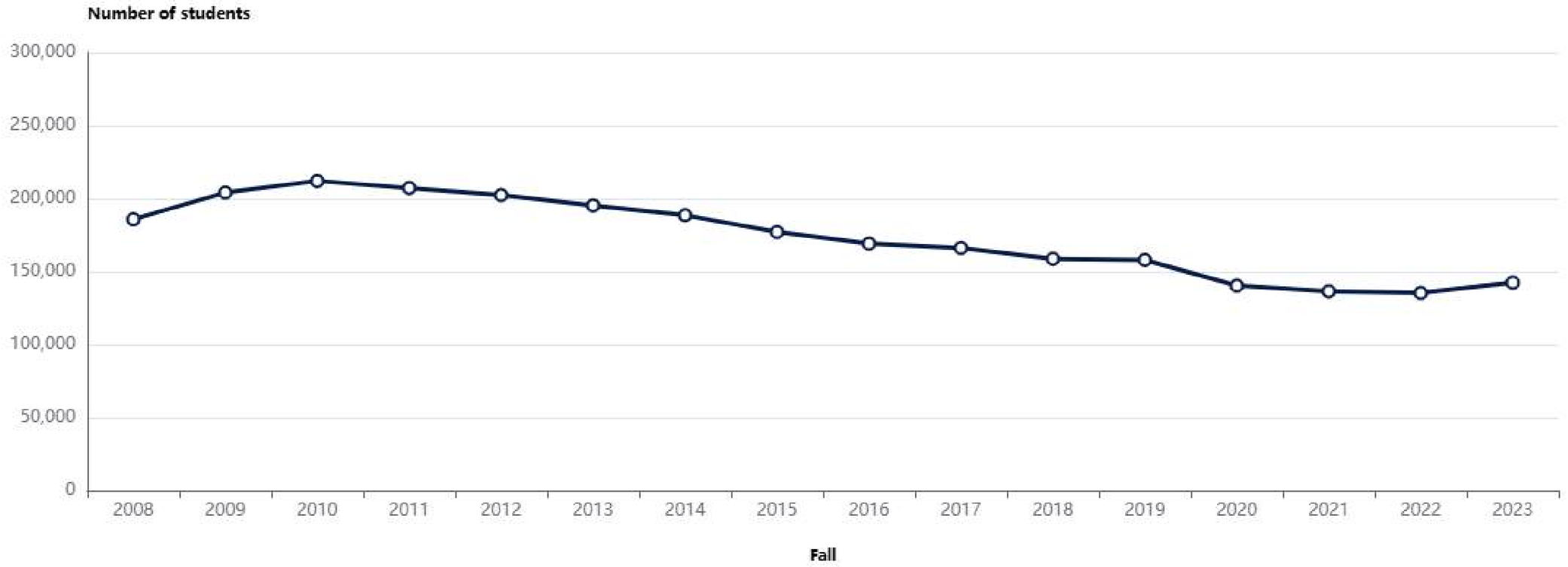
# Educational underemployment is a challenge in New Jersey




*Source: Lightcast

# NJ community college enrollment has been steadily declining since 2010

Number of Students Enrolled (Fall) in Public and Private 2-year or less Institutions in New Jersey




*Source: IPEDS*

# Just 63% of teens say they plan to attend college (2 or 4 year) after high school

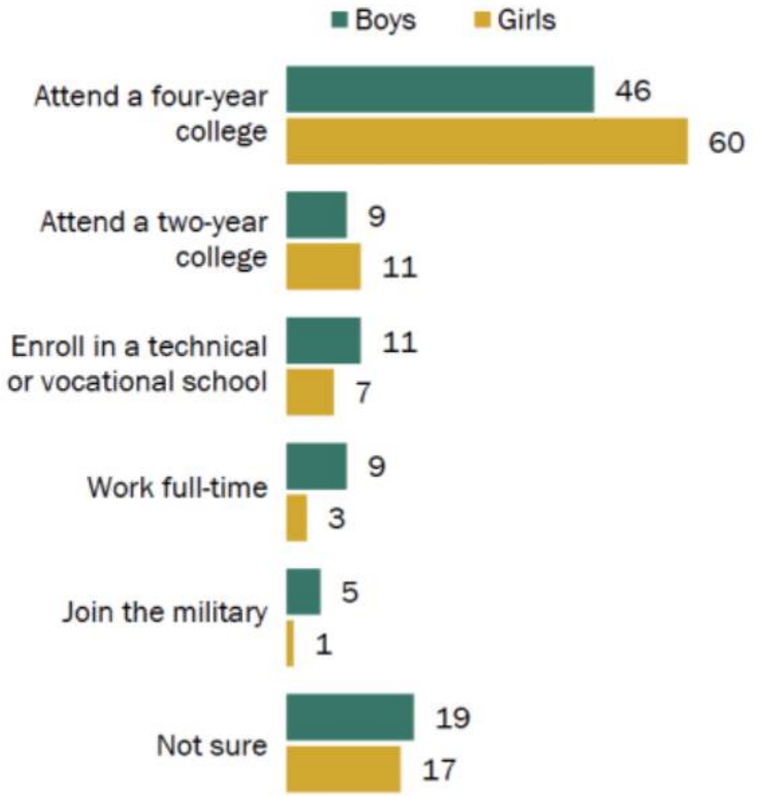
Girls are more likely than boys to say they plan to attend a four-year college, and **boys are more likely to plan to attend a two-year college, technical or vocational school, work full-time, or join the military.**

55% of White teens say they plan to attend a four-year college, 43% of Hispanic teens, and 50% of Black teens. **Black and Hispanic teens are more likely** than White teens to say they plan **to attend a two-year college.**

63% of teens from $75,000+ households say they plan to go to a four-year college, whereas only **23% of teens from households with incomes under $30,000** say they plan to.

**Teen girls are more likely than boys to say they plan to attend a 4-year college**

*% of U.S teens ages 13 to 17 saying they plan to ____ after they finish high school*




Note: Full question wording was "Which of the following comes closest to what you plan to do after you finish high school?" Share of respondents who selected "Other" (2%) is not shown.
Source: Survey of U.S. teens conducted Sept. 18-Oct. 10, 2024. "The Gender Gap in Teen Experiences"

*Source: Pew Research*

# Young people are interested in and satisfied with non-degree pathways(e.g., apprenticeship, certificate, certification, license)

**Student Perspective:** **90%** Of young people in nondegree pathways report high satisfaction, citing **hands-on learning** and **faster completion as key benefits**.

**Parent Perspective:** **88%** Of parents expressed interest in learning more about nondegree pathways for their children. Parents with a bachelor's degree or higher and **Black and Hispanic parents were more likely to say they were interested in learning more about nondegree pathways.**

*Source: JFF 2024, Beyond Degrees*

# Technology disruption is making upskilling and reskilling a priority

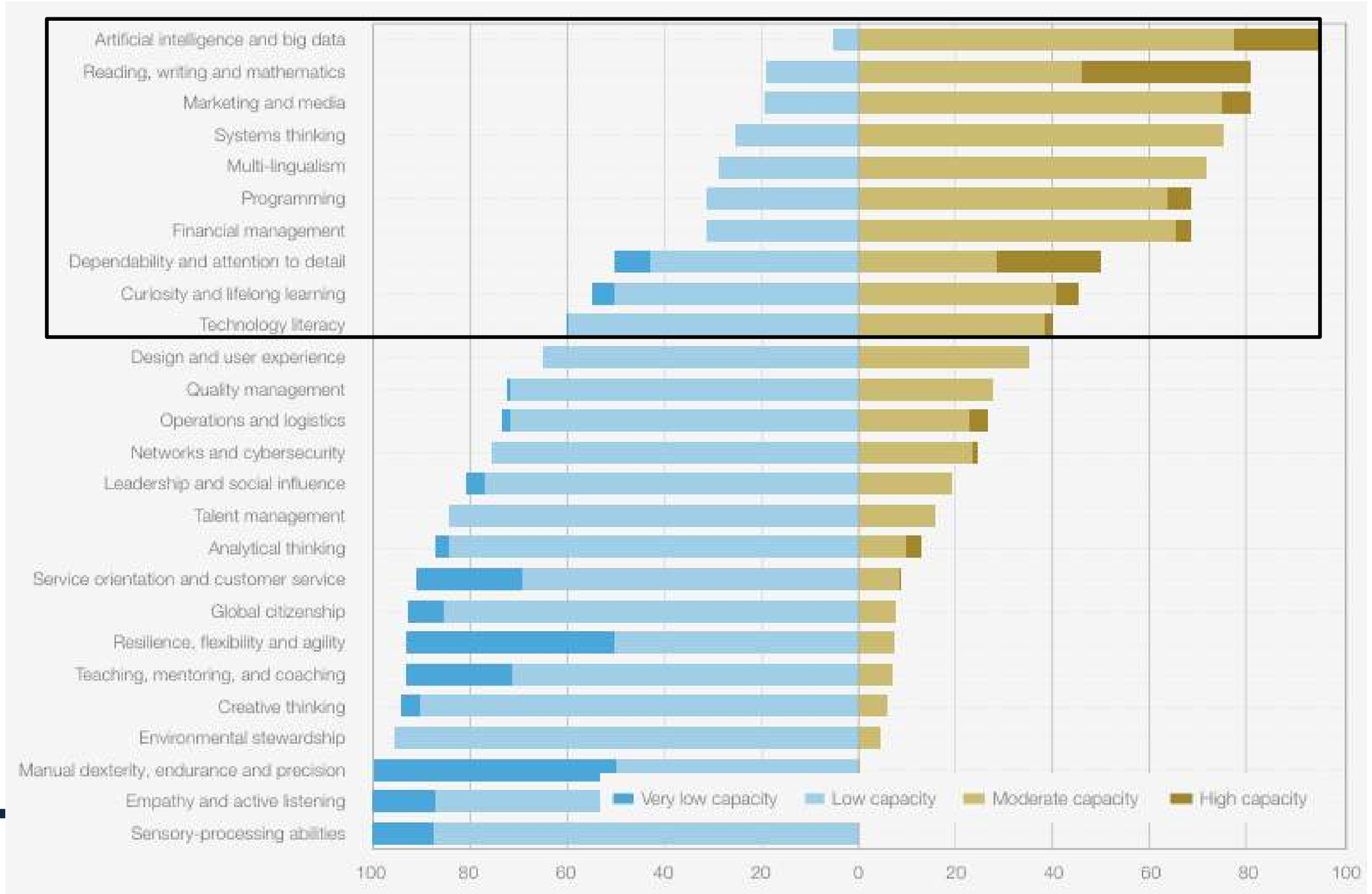



*Source: WEF Future of Jobs Report, Harvard Center on Workforces, WEF Future of Jobs Report, LinkedIn*

GenAI is poised to disrupt a variety of skillsets, from **technology and data related to writing, marketing, and even certain durable/human skills.**

## Current Capacity for Substitution by Generative AI, by Skill Group

% of Skills with Moderate to High Capacity for GenAI Substitution, World Economic Forum



# Durable skills are more critical than ever and support job mobility over the course of a career

## Human skills

Adaptability*

Communication

Conflict resolution

Collaboration

Leadership

Problem solving

Teaming

## Business enablers

Customer service

Data communication

Project management

Sales

## Data building blocks

Analytical thinking

AI literacy

Computer coding

Data analysis

Research



Sources: BHEF, LInkedIN

# CASE STUDY

Connecticut Online AI Academy

Goal:
Mobilize resources to meet the region's AI skilling and reskiling needs

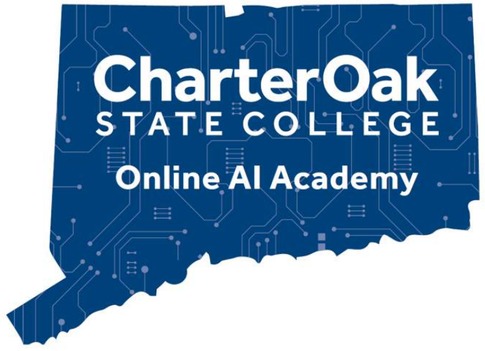
# Connecticut Online AI Academy

**Approach**

- Grow with Google and Charter Oak State College partner to launch an Online AI Academy using Google's resources available to higher education.
- Charter Oak, a public online college serving the state, makes courses available for no charge to residents throughout the state.

**Outcomes to Date:**

- Courses have been made available to support learners in:
  - Essential AI Knowledge
  - Real-World Skills
  - An Industry-Recognized Badge
  - Flexibility
- First cohorts have been fully subscribed




Google

## CASE STUDY

West Georgia Technical College

**Goal**

- Mobilize the regions workforce and educational system to meet the 100%+ surge in regional demand for manufacturing engineers, machine operators, and technician

# Regional Workforce Training Center to address skills gaps in advanced manufacturing

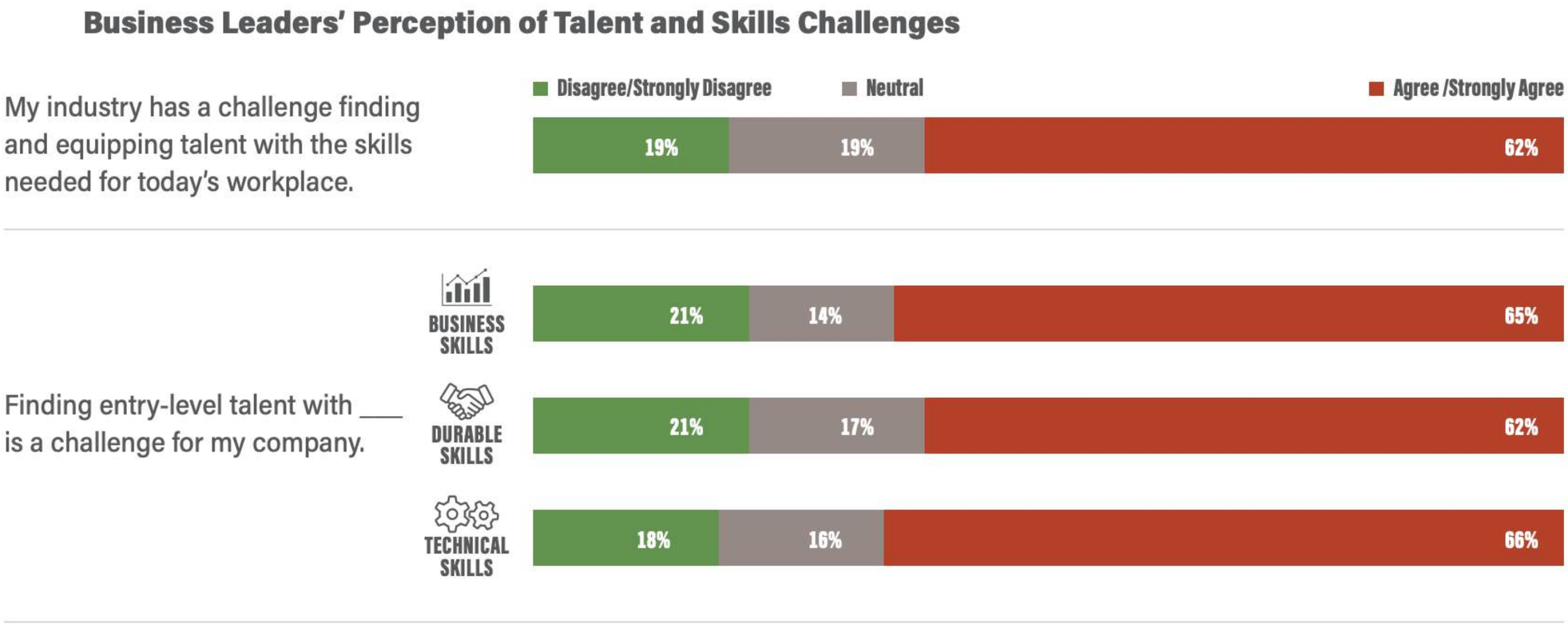
**Approach:**

- Established Regional Workforce Training Center (RWTC) with grant funding
- Created industry advisory boards to identify critical skills needs
- Launched subscription-based training model to standardize and scale courses
- Provided quick-response, customized training (as fast as 3 weeks)
- Built mobile training units for onsite employer training

**Outcomes:**

- 1,100 training session conducted
- 1,600 learners benefited
- 32 employers successfully trained
- Delta Airlines cited 60% improvement in workforce capabilities from their partnership with WGTC
- Successfully addressed critical skills shortages in CNC machining, maintenance, and green technology

# Partnerships are critical for preparing learners with future-ready skills




**Note**: N=380 business leader responses. Fig. 1 shows the percent of business leader respondents who select statement. Survey Question: "Please rate your agreement with the following statements as it pertains to skill shortages: Finding entry-level talent with business skills is a challenge for my company; Finding entry-level talent with soft or durable skills is a challenge for my company; Finding entry-level talent with the technical skills needed for emerging occupations is a challenge for my company; My industry has a challenge finding and equipping talent with the skills needed for today's workplace."
**Source**: SSPRS 2024 responses.

# Partnerships are a priority, but not easy to do well

**87%**

of **higher education leaders** agree that partnerships with business are a priority

**89%**

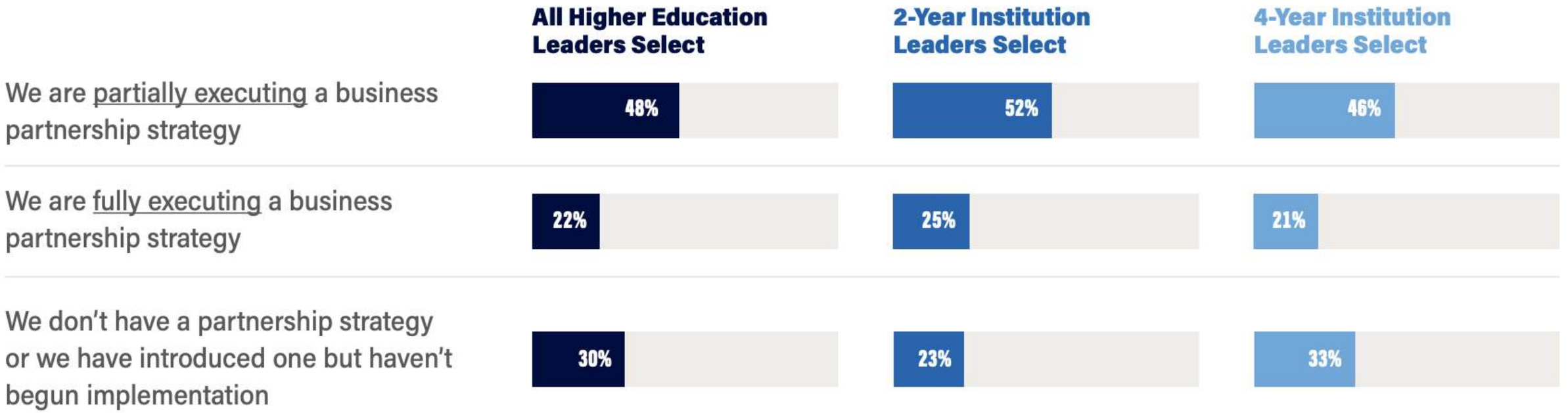
of **business leaders** agree that partnerships with higher education are a priority

**22%**

of **higher education leaders** say they are fully executing a partnership strategy

# Community colleges are leading the way

**Status of Higher Education's Business Partnerships** by Institution Type




**Note**: N=226 higher education leader responses. Fig. 13 shows the percent of respondents who selected each option. Survey Question: "What is the status of your institution's business partnerships?"
**Source**: SSPRS 2024 responses.

# Partnership priorities vary for education and business leaders

**Business Leaders** Select Top Priorities for Higher Education Partnerships

**45%**
PROVIDING UPSKILLING/RESKILLING TRAINING TO EXISTING WORKFORCE

**35%**
STRENGTHEN RECRUITMENT AND HIRING PIPELINES

**31%**
INCREASE ACCESS TO EXPERIENTIAL LEARNING

**29%**
EXPAND EMPLOYER ENGAGEMENT IN DEVELOPING AND TEACHING CURRICULA ALIGNED TO INDUSTRY NEEDS

**27%**
ENSURE STUDENTS HAVE THE RIGHT SKILLS AND CREDENTIALS TO ENTER THE WORKFORCE

**Higher Education Leaders** Select Top Priorities for Business Partnerships

**56%**
ENSURE STUDENTS HAVE THE RIGHT SKILLS AND CREDENTIALS TO ENTER THE WORKFORCE

**53%**
INCREASE ACCESS TO EXPERIENTIAL LEARNING

**31%**
PROVIDE BETTER INFORMATION ON CAREER PATHWAYS TO STUDENTS AND WORKERS

**30%**
STRENGTHEN RECRUITMENT AND HIRING PIPELINES

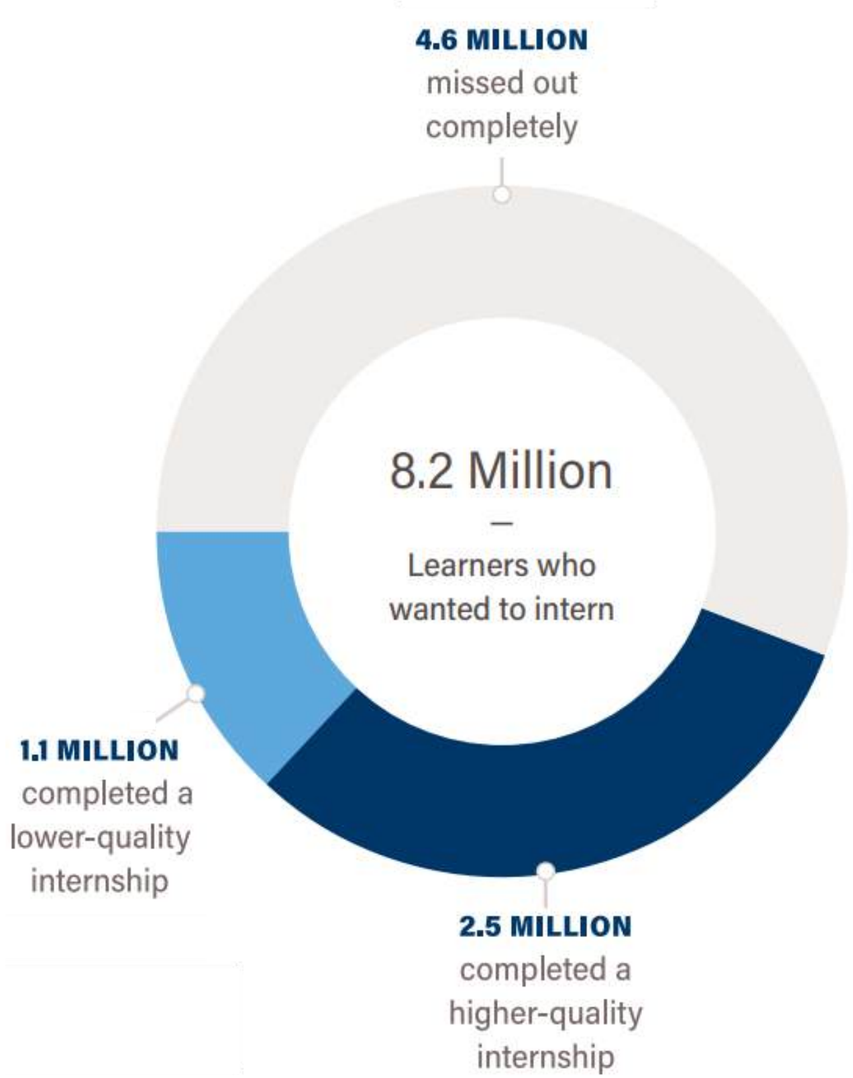
**25%**
EXPAND EMPLOYER ENGAGEMENT IN DEVELOPING AND TEACHING CURRICULA ALIGNED TO INDUSTRY NEEDS

# Experiential learning is a key ingredient for skill development and employers seeking “ready” talent

## Impacts of Internship on Student Outcomes


Sources: BHEF Expanding Internship Report 2024

# Yet existing supply is insufficient and unevenly distributed






Sources: BHEF Expanding Internship Report 2024

# CASE STUDY: WORKFORCE PARTNERSHIP INITIATVE (WPI) – TEXAS

This initiative focuses on aligning education and training with real-time labor market needs—especially in high-demand fields identified under House Bill 8.

Together, community colleges, private sector leaders, and key intermediaries are creating accelerated, skills-based pathways that position more Texans for career success.

Business Roundtable | Texas Association of Community Colleges | Texas Business Leadership Council | BHEF Business-Higher Education Forum

The Workforce Partnership Initiative (WPI) empowers employers to take the lead in shaping talent pipelines by collaborating with local higher education institutions.

WPI expanded to El Paso, Dallas, and San Antonio in 2022 and is currently growing its footprint.


**33**
Credentials of Value Developed

**6,500+**
Enrollments

**3,200+**
Completions

**1,900+**
Industry Certifications Earned

**Across Institutions*

# CASE STUDY: CREATING NEW PATHWAYS

EY redesigned hiring practices to enable increased hiring of associate degree graduates for key roles.

***"We realized that many of the tasks required by our service delivery center could be performed by someone with an associate degree. The pilot became a strategy to meet our staffing needs and realize cost efficiencies. It was also an opportunity to give individuals meaningful work based on their skills and training."***
- Ellen Glazerman, Executive Director, EY Foundation, and Americas Director, EY University Relations

ALAMO COLLEGES DISTRICT
San Antonio College

EY

BHEF BUSINESS-HIGHER EDUCATION FORUM®

**Strategic Alignment for Impact**

**Clear Goals & Outcomes:** EY and Alamo Colleges set a shared objective—recruiting 230 students into entry-level roles within three years. This alignment provided a roadmap for success.
**Addressing Workforce Challenges:** EY needed a new talent pipeline due to a nationwide decline in accounting graduates. Partnering with Alamo Colleges unlocked a pool of skilled associate degree holders.

**Mutual Ownership & Defined Roles**

**Bridging Industry & Education:** With EY new to working with community colleges, Business-Higher Education Forum (BHEF) played a key role in translating goals and structuring the partnership.
**Clear Responsibilities:** Both partners adapted processes and expectations to ensure efficient collaboration and program execution.

**Delivering ROI for Both Partners**

**For EY:** The partnership filled staffing needs, created cost efficiencies, and diversified talent pipelines. The success of the model has influenced EY's approach to future workforce initiatives.
**For Alamo Colleges:** The collaboration reinforced the value of an associate degree, established Alamo as a trusted industry partner, and provided a tested, scalable model for future partnerships.

# CASE STUDY:

# DEVELOPING WORKFORCE PATHWAYS

**Problem:**

- Severe deficits in cybersecurity talent
- Increasing need to protect business information and systems against cyber risks

**Solution:**

- Diverse talent ecosystem that meets regional need for in-demand, high-skilled, high-wage cyber jobs

## Cybersecurity pathways to meet regional workforce needs

- **Ensured graduates have needed skills** and pathways to work-based learning
- **10,000+ bachelor's degrees awarded** in cybersecurity
- **$2.785M+ scholarships** through UMBC's Cyber Scholars Program

- **Served full-time and working adult students** via online programs, certification programs, and bachelor's degree

BHEF BUSINESS-HIGHER EDUCATION FORUM®

NORTHROP GRUMMAN

UNIVERSITY SYSTEM of MARYLAND

# CASE STUDY:

## BUILDING REGIONAL WORKFORCE INITIATIVES

**Problem:**

- Urgent need for tech talent for Connecticut businesses
- Challenges sourcing talent
- 50%+ of tech job postings require a bachelor's degree
- Local colleges and universities struggle to produce graduates
- Skills gap negatively impacting state economy

**Solution:**

- Create workforce accelerator to align higher education to business needs

Tech Talent Accelerator: an accelerated approach across the workforce and higher education ecosystem to address urgent tech talent need.

BHEF BUSINESS-HIGHER EDUCATION FORUM®

**In just two years:**

- **Engaged 79 partners** across business, higher education, nonprofit, and government
- **Provided microgrants to faculty to create tech programs** or embed tech credentials into existing programs, mapped to industry partner needs
- **Developed and tailored tech microcredentials** in areas such as data analytics, cybersecurity, mobile application development, and game development
- **Governor spoke at statewide summit** to advance a tech-talent action plan and gain employer hiring commitments
- Colleges launched **15 programs** enrolling more than 450 learners
- Learners earned **117 industry-recognized credentials,** completed 109 internships, secured 116 jobs, and received 9 promotions

# Community colleges are critical to national, regional and individual economic growth, particularly when delivering

*In demand skills*

*Experiential learning*

*Network activation*

## In collaboration with business and the broader community

# The path forward requires us to...

**Pursue Transparency and Build Trusting Relationships**: Strong alliances thrive when partners operate with trust, openness, and a dedication to advancing each other's success. Establishing a sustainable, mutually beneficial business model is crucial.

**Engage Executive Leadership:** Involve CEOs and higher education leaders from the outset to drive urgency, align goals, and accelerate outcomes.

**Communicate the Value Proposition Clearly:** Define and share the specific benefits for each partner—especially employers. Identify the business challenges the partnership addresses, such as talent acquisition or retention, to ensure sustained engagement and alignment.

**Utilize Existing Resources, Initiatives, and Technologies**: Leverage current programs, funding streams, and partnerships to secure early wins and build momentum. Use data analytics, CRMs and other tools to align educational programs with industry needs.

**Support Sustainability and Scalability**: Establish a habit of recording key decisions, roles, workflows, and results to inform continuous improvement and support future replication or scaling.

**Use Intermediary Organizations**: Engage third-party organizations to strengthen partnerships, provide additional resources and expertise.

# Driving Impact through BHEF's Solutions Lab

**Insights & Thought Leadership**: Deliver market intelligence, actionable insights, toolkits, and public case studies.

**Higher Education Transformation**: Assessment, planning tool and experience to empower higher education institutions to be the partner of choice for business and align with workforce needs.

**New Talent and Credential Models**: Co-design innovative business and education solutions to develop, recruit, and connect talent to evolving workforce needs.

**Execution, TA and Impact Partnership**: Intermediary and technical assistance support for federal grants and capacity building via fostering communities of practice.

**Catalyze Regional Partnerships**: Design and champion regional convenings and empower leaders to develop and accelerate impact of collaborative models for economic growth.

Turn Your Challenge into An Opportunity

BHEF BUSINESS-HIGHER EDUCATION FORUM®

# Thank you!

**For additional information, contact me at Jennifer.Thornton@bhef.com**

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

NJ PATHWAYS TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce
SUMMIT 2025

# PATHWAYS PROJECTS NETWORKING

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# DESIGNING FOR IMPACT: RESEARCH INSIGHTS AT THE NEXUS OF EDUCATION AND EMPLOYMENT

**Michelle Van Noy**

**Director and Associate Research Professor**

Rutgers University School of Management and Labor Relations

RUTGERS–NEW BRUNSWICK
Education and Employment Research Center
School of Management and Labor Relations

# Designing for Impact: Research Insights at the Nexus of Education and Employment

NJ Pathways to Career Opportunities Summit
June 4, 2025

Michelle Van Noy, Ph.D.
Education and Employment Research Center, Rutgers University

# Rising Individual Interest in Short-term Workforce Credentials

- Individual preference in noncredit and NDCs
  - Post pandemic trends point to interest in NDCs…
    - Over 2/3 of adults considering education prefer nondegree, up from 1/2 pre-pandemic (Strada, 2020).
    - Among “great resigners”, 72% were enrolling in programs that are 6 months or shorter (Cengage, 2022).
  - Decreased interest in college degrees
    - 29% of adults think that getting a four-year college degree is not worth it. (Fry, et al. 2024). https://www.pewresearch.org/social-trends/2024/05/23/is-college-worth-it-2/

RUTGERS UNIVERSITY

# Increasing Public Investment in Short-term Workforce Credentials

- HCM report finds 59 state-led initiatives across 28 states, close to $3.8 million
- State funding investments
  - Examples: Get There FL, IN Next Level Jobs, NJ Pay It Forward, LA MJ Foster, VA Fast Forward, and others.

- Short-term Pell discussions continue

# Proliferation of Short-term Options

| Type | Definition | Est. # |
|---|---|---|
| Sub baccalaureate credit certificates | Credential awarded by an educational institution for completion of a subbaccalaureate credit educational program, usually less than one year in length (short-term and long-term credit) | 50,000 |
| Noncredit certificates | Credential awarded by an institution (educational or workplace) for completion of a noncredit educational program | 58,000 |
| Apprenticeship | Credential awarded after completion of structured educational and workplace program based on industry and occupational standards. | 27,000 |
| Industry certification | Credential awarded by an industry body or governmental agency for demonstration of skills typically via examination based on industry or occupational standards. | 7,000 |
| Occupational or professional license | Credential awarded by a governmental agency for demonstration of skills in a specific occupation and sometimes also completion of an educational program; often required to work in an occupation. | 12,000 |
| Badges | Credential awarded for completion of a short program of study or demonstration of a targeted set of skills; these are newly emerging and are still being developed. | 430,000 |

Estimates are from Credential Engine (2022), https://credentialengine.org/resources/counting-u-s-secondary-and-postsecondary-credentials-report/

# Evolving State Policy Discussions

- State policy discussions around quality credentials, skills-based hiring, LERs
- National Skills Coalition, Quality Postsecondary Credential Policy Academy
    - Develop quality definitions
    - Promote policy agendas to improve attainment levels, equity
    - Improve state noncredit data capacities
- State credential quality lists
    - Examples:
        - Alabama Committee on Credentialing and Career Pathways' Compendium of Valuable Credentials
        - Colorado's Quality and In-Demand Credentials Framework
        - NC Workforce Credentials Advisory Council's priority non-degree credentials
        - Tennessee Promoted Student Industry Credentials

# Evolving College Practices

## Focus of Noncredit Education

- Shift to prioritize workforce > comprehensive approach
- Reconsideration of target student population

## Organization of Noncredit Education

- Dramatic variation and shifts in organizational location
- Increased partnerships to increase capacity and reach

## Structure of Noncredit Education

- Decision to offer in noncredit driven by speed and flexibility, also skill and credential needs in the labor market
- Interest in developing pathways to credit, variability in progress
- Few supports for noncredit students

Source: EERC Landscape Scan of Community College Noncredit Education

# Many questions about data and quality…

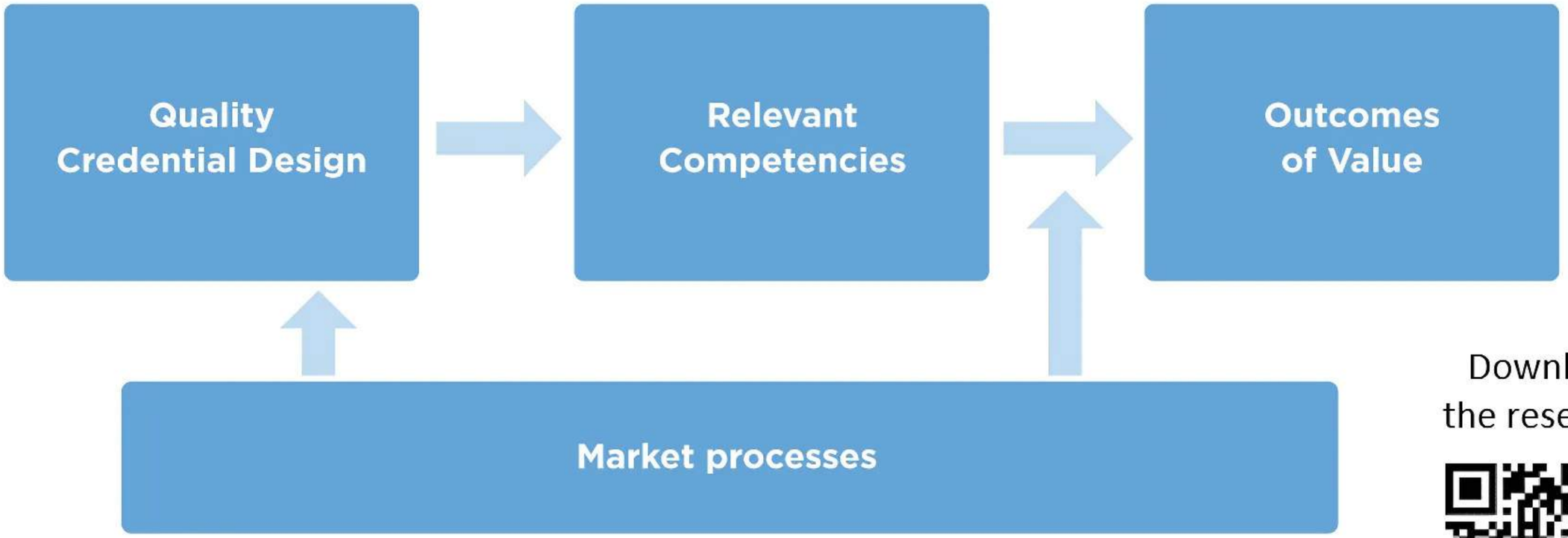
- **Defining Quality…** What is quality? How to define & promote quality?
- **Building the NDC Quality Ecosystem…** What systems exist to promote quality? How to build the quality ecosystem?
- **Building the Data Infrastructure…** What data are available? How to build the needed data infrastructure?

# Defining Quality

**What is quality?**
**How to define and promote quality?**

RUTGERS UNIVERSITY

# Quality includes several conceptual areas




Download the research:

Based on EERC's conceptual model for non-degree credential quality:
https://go.rutgers.edu/NDCQualityFramework

# Quality Definitions Relate to Stakeholder Goals

| *Stakeholder* | *Goal* | *Key Questions to Consider* |
|---|---|---|
| Individuals | Informed decision making | How do we know as an individual whether it is a good investment of time and money to pursue an NDC? |
| Employer | Informed decision making | How do we know whether NDCs are a useful indicator of skill and competency to be used in hiring and advancement? |
| Policy Makers | Accountability | How do we know whether public funds should be used to support the attainment of NDCs? |
| Credential Providers | Program Improvement | How can NDCs be improved? |

RUTGERS UNIVERSITY

# Elements of Quality Credential Design

Labor market relevance

Transparency

Stackability/articulation to cr

Accessibility

Instructional processes (esp delivery)

Student supports

# Research on National Landscape of Noncredit Education

- Study provides a snapshot of essential issues and trends in community college noncredit workforce education
- Interviews of 29 community colleges across 22 states in spring 2021; topics included:
    - focus of noncredit
    - organizational structure
    - target student population
    - mechanisms for offering programs and ensuring quality
    - connections to credit-bearing programs

RUTGERS UNIVERSITY

# Trends in the Landscape of Noncredit Education

- Labor market analysis – most commonly-mentioned approach to ensure quality
- Reliance on industry certificates, alignment with external standards
- Involvement of faculty in program development
- State approval processes, particularly associated with FTE funding
- Student demand as an indicator
- Earnings outcomes, but little data are available

RUTGERS UNIVERSITY

# Research on Community College Noncredit Program Quality: Design

Interviews with administrators & faculty at 4 colleges (2022-23)

Examined two programs from each college

Download the research:

https://go.rutgers.edu/4l15shwu

TABLE 1: SELECTED PROGRAMS AND CREDENTIALS BY COLLEGE

| College/ Program | NDC Type | NDC Name |
|---|---|---|
| **Harper College, IL (Harper)** | | |
| Real Estate | License | Illinois Real Estate Broker |
| Solar Photovoltaic Associate Certification Prep; Solar Business and Technical Sales | Certification; Digital badges | North American Board of Certified Energy Practitioners (NABCEP) Associate; NABCEP Solar Business and Technical Sales (the course provides approved training hours toward this certification) |
| **LaGuardia Community College, NY (LaGuardia)** | | |
| Community Health Worker | Certificate | Community Health Worker |
| Medical Billing | Certificate | Medical Billing Specialist |
| **Mt. San Antonio College, CA (Mt. SAC)** | | |
| Electronics | Certificate | Electronic Systems Technology Skills |
| Emergency Medical Technician | Certification; License | National Registry EMT; State EMT |
| **Northern Virginia Community College, VA (NOVA)** | | |
| Medical Assistant | Certification | Certified Clinical Medical Assistant (CCMA) |
| CompTIA® Network+ | Certification | CompTIA® Network+ |

# Contextual Influences on Noncredit Programs

- Funding
  - Harper: Noncredit workforce courses categorized as “nontransferable credit” courses and receive some state reimbursement
  - LGA: No state formula funding; some state and city allocations, plus grants
  - Mt. SAC: CA provides funding for short-term vocational training/workforce prep programs that consist of 2+ courses that lead to a state-approved noncredit certificate
  - NOVA: Fast Forward, performance-based state funding established in 2016; focuses on industry-recognized credentials in high-demand fields
- College organization
  - Harper: Noncredit workforce programs are in the credit Career Technical Programs division
  - LGA: Division of Adult and Continuing Education
  - Mt. SAC: Continuing Education
  - NOVA: Continuing Education

RUTGERS UNIVERSITY

# Key Findings on Community College Noncredit Program Quality

Key markers of noncredit program quality emerged including:

- Local and regional labor market alignment
  - Examples: LGA's medical billing program; VA Fast Forward state approval
- Curricula/instruction that prepare students with test-taking, occupational, and employability skills
  - Example: NOVA's Medical assistant program
- Instructors with significant work experience using the credentials that they teach
  - Example: Harper's real estate program
- Sufficient funding and resources to make programs accessible
  - Example: Mt. SAC and NOVA
- Articulation varies by field and institution
  - Example: Mirrored courses- Mt. SAC and Harper; LGA medical billing and coding

RUTGERS UNIVERSITY

# Research Review of Outcomes: Design

- Focused on outcomes for occupational noncredit training and NDCs
- Based on a core group of 15 key articles on noncredit and NDC outcomes
- Data comes from two main sources: national surveys and state administrative data.
- Methodology
  - Comparisons: pre-post studies of the same individual, more or less education comparing between two different individuals
  - Analytic Approaches: descriptive statistics and multivariate analysis
- Data and methods are variable, making comparisons across studies challenging.

Download the research:

RUTGERS UNIVERSITY

# Research Review of Outcomes: Findings on Pathways Progression

**Few noncredit students transition to credit pathways.**

- In a five-state study, four states moved only 1 in 20 noncredit students into for-credit education (Bahr et al).
- Only one in four students seeking a noncredit credential earned one, and only 5% completed a stackable credential (McConville et al).
- Only 22% of credential-seeking noncredit students enrolled in for-credit courses for at least two semesters and passed at least one credit-bearing course (Xu & Ran).

RUTGERS UNIVERSITY

# Research Review of Outcomes: Findings on Labor Market Gains

## Noncredit programs lead to modest but measurable gains

- Certificate holders earned more than the average high school graduate but less adults with at least one year of college (Baum et al)
- Average earnings of noncredit students in Texas were $6,000 higher one year after enrollment. (Bahr et al)

## Wage premiums varied by program/occupation and gender

- Wages were 42% higher one year after certification in professional, scientific, and technical services, health care, manufacturing, and public administration, but dropped in education services, retail trade, and accommodation and food services (CDEP)
- Certificates and certifications in male-dominated fields provided a nearly $20,000 earnings boost compared to adults lacking any credential, while female-dominated fields had very little to no wage premium (Strada, Gallup, & Lumina).
- Students who reported their current job was closely related to their recent training programs reported wage 3x larger than students whose job was not related to their training (McConville et al).

## More research is needed to make sense of the range of noncredit programs.

RUTGERS UNIVERSITY

# Discussion

- What is one noncredit practice used by your institution that you view as important to promoting quality?

RUTGERS UNIVERSITY

# Building the NDC Quality Ecosystem

**What systems exist to promote quality? How to build the quality ecosystem? What is the role of data?**

RUTGERS UNIVERSITY

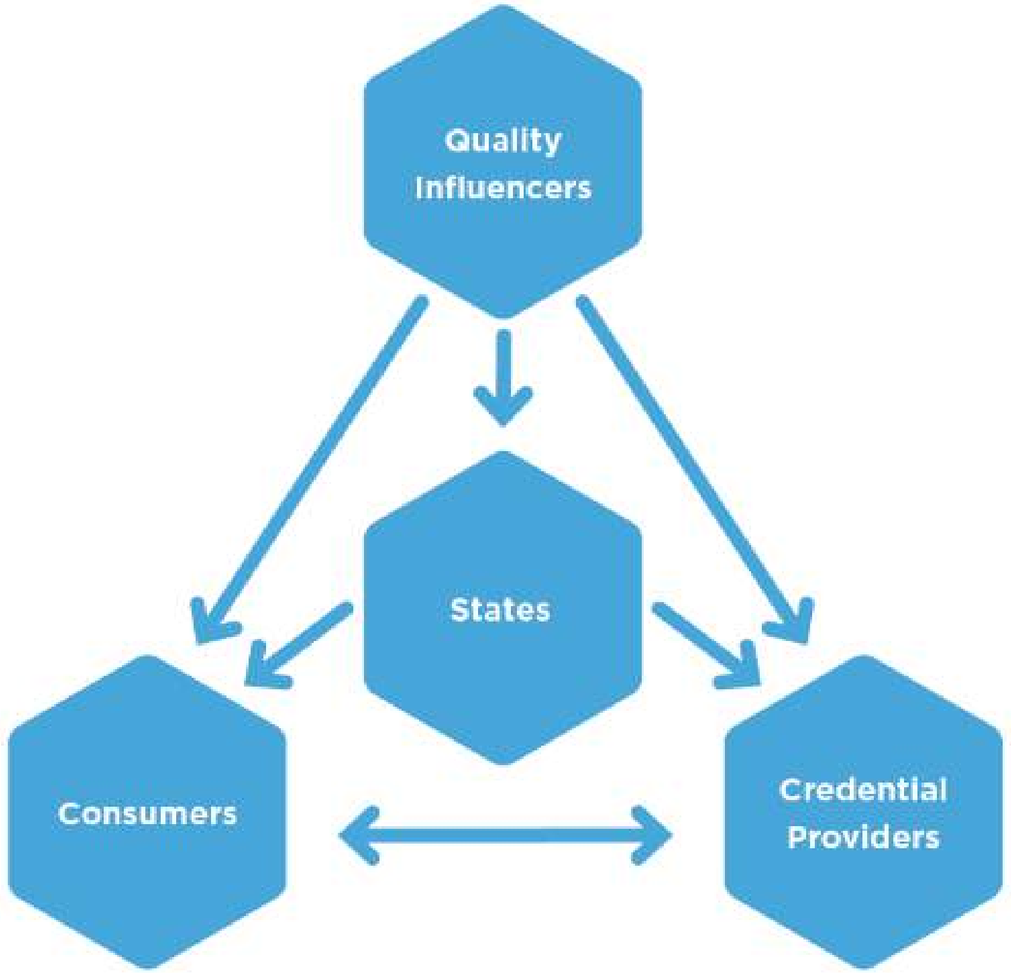
# Research: Landscape scan of quality influences on non-degree credentials (microcredentials)

- Interviews with 36 leaders, 29 organizations
- Systematic web scan of recent publications
- Systematic web scan of key actors and their efforts
- NCSL Jan 2023 convening of key actors
- Organization summaries of 29 NDC quality influencers we interviewed & 30 potential NDC quality influencers identified through scan

Download the research:

For more information on the quality ecosystem research:
https://go.rutgers.edu/MappingNDCMarket

# Beginning Snapshot of the Emerging Quality Ecosystem



# Credential Providers of NDCs


Educational Institutions - 4 year and 2 year, credit and noncredit


Private training providers, boot camps, online, and emerging providers

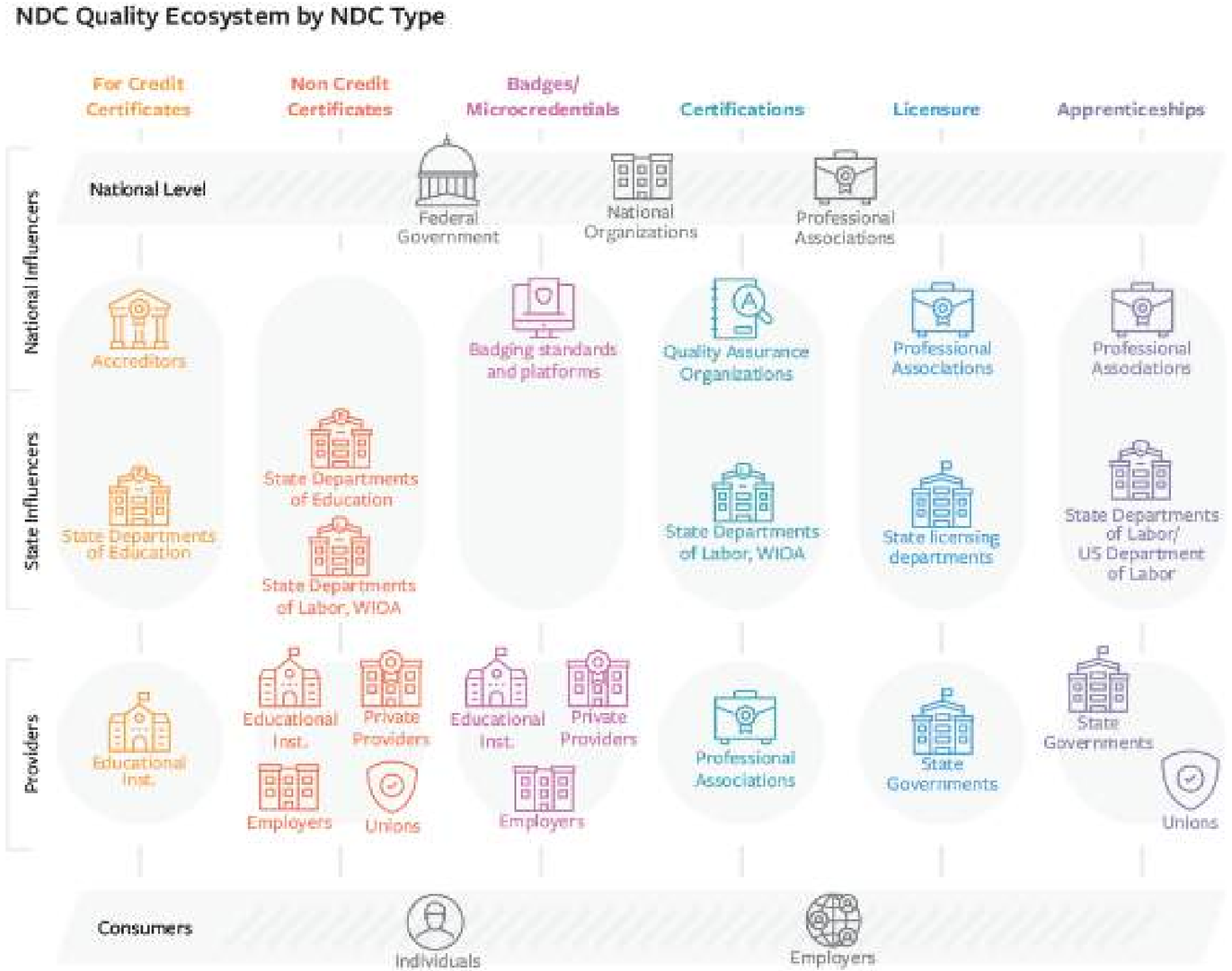

Private companies


Professional and industry associations


Joint training funds


State occupational licensing departments

# Multiple Influences and Ecosystems for Quality



RUTGERS UNIVERSITY

# Informing Consumers

NDC Quality Influencers Focused on Consumers

## Information for Individuals

- US DOL Career
- OneStop
- State ED
- State DOL ETPLs

## Information for Employers

- Guild
- SHRM
- Chamber
- BHEF
- EQOS

# Reforms Among Providers

## NDC Quality Influencers Targeted at Providers

**Program-Based Short-Term Occupational Credentials**
Certificates, Badges

**Industry-Based Occupational Credentials**
Certificates, Licenses, Apprenticeship

### Educational Institutions

*Reforming practice*: Education Strategy Group (ESG), League for Innovation, Education Design Lab (EDL), American Association of Community Colleges (AACC), New America, Business Higher Education Forum (BHEF)

*Competency-based education/CPL*: Council for Adult and Experiential Learning, American Council on Education (ACE), Competency-Based Education Network (C-BEN), Quality Assurance Commons

*Standards*: New England Commission on Higher Education (NECHE), Higher Learning Commission (HLC), University Professional and Continuing Education Association (UPCEA), Accrediting Commission of Career Schools and Colleges (ACCSC), Middle States

### Private Providers

Middle States, CIRR

Online Providers

Quality Matters, Digital Promise

### Professional Associations

Workcred, ANSI National Accreditation Board (ANAB), Institute for Credentialing Excellence (I.C.E.), National Commission for Certifying Agencies (NCCA), American Society for Testing and Materials (ATM), International Organization for Standardization and the International Electrotechnical CommissionISO/IEC

### State Government Agencies

National Council on State Legislators (NCSL), Council on State Governments, Council on Licensing Enforcement and Regulation (CLEAR)

### Badging (*across providers*)

Credly, Canvas Credentials (formerly Badgr), IMS Global, Open Badges, Digital Promise, other platforms

# Guiding States

## NDC Quality Influences Targeted at States

**Standards:** National Skills Coalition (NSC), New England Commission on Higher Education (NECHE), Quality Assurance Commons (QAC), Digital Promise (DP), Education Strategy Group (ESG)

**Reforming Practice:** Advance CTE, C-BEN, NGA, SHEEO

RUTGERS UNIVERSITY

# **Quality Influencers:** Higher Education Accreditors—Set Norms for Certificates

- Council of Higher Education Accreditation (CHEA)
- Accrediting Commission for Community and Junior Colleges
- Commission on Accreditation of Allied Health Education Programs (CAAHEP)
- EFMD Quality Improvement System (EQUIS)
- Accrediting Commission of Career Schools and Colleges
- The Middle States Association Commission on Elementary and Secondary Schools (MSA-CESS)
- Former Regional Higher Education Accreditation Agencies.
  - NECHE … noncredit accreditation
  - HLC… Credentials Lab

RUTGERS UNIVERSITY

# Building Data Infrastructure

- Credential Engine
- Education Quality Outcomes Standards (EQOS)
- Data infrastructure building
  - Coleridge
  - NASWA's NLX Research Hub
  - Rutgers EERC State Noncredit Data project
  - SHEEO/Education Strategy Group Noncredit Mobility Academy

RUTGERS UNIVERSITY

# Discussion

- What strategies have the most promise to support a system that ensures quality?

RUTGERS UNIVERSITY

# EERC's State Noncredit Data Project

**Research partnerships** to better understand noncredit including:

- Noncredit data inventories with established states: IA, LA, VA (Phase 1) and a mix of established and emerging states: MD, NJ, OR, SC, TN (Phase 2)
- Additional research focuses on data inventories with a range of state entities, promising practices, scan of state policy, and analysis of state governance.

**Noncredit data taxonomy** to guide data collection efforts across state, institutional, and federal levels.

**Network** dedicated to building the noncredit data infrastructure, including quarterly learning community meetings open to all interested stakeholders; and monthly specialized working groups for states only to share practices on data collection, policy and governance, and aligning program data with labor market information.

RUTGERS UNIVERSITY

# Noncredit Data Taxonomy 2.0

## Based on Multi-Phase, Multi-State Noncredit Data Inventory

Based on inventory & analysis of 8 partner states (IA, LA, VA; NJ; SC; OR; MD; TN)

Addresses realities & aspirations

Data availability dependent on data systems, mandates, and partnerships

Full taxonomy includes complete list of data elements and operational definitions

***New Components in updated 2.0 version**

**Purpose and Design**

- Field of Study
- Noncredit Type
- Program Length and ***Admission***
- Delivery
- ***Accessibility***
- ***Provider Information***
- ***Student Services***
- Associated Non-Degree Credentials

**Outcomes**

- Academic Outcomes
- Labor Market Outcomes
- Non-Degree Credential Outcomes

**Enrollment & Demographics**

- Enrollments
- Demographics
- Identifiers

**Finance & *Policy***

- Tuition and ***Student Costs***
- State and Federal Funding
- ***WIOA Information***

RUTGERS UNIVERSITY

**Learn more about the *State Noncredit Data Project***
https://sites.rutgers.edu/state-noncredit-data/

***Noncredit Data Taxonomy 2.0 and Implementation Guide for States: Lessons Learned from Phase 2 of the State Noncredit Data Project***
https://go.rutgers.edu/EERCnoncredittaxonomy

For interested states, contact Paula.Nissen@niacc.edu to sign up for a Specialized Working Group.

RUTGERS UNIVERSITY

# Discussion

- What noncredit data collection practices have worked well at your institution? What practices are challenges?

RUTGERS UNIVERSITY

# Recent Publications on Quality in Noncredit Education

## *Quality in Community College Non-Credit Education:*

*Noncredit Students at Two Community Colleges: Who Are They and What Are Their Experiences?* https://go.rutgers.edu/btfb9aay

*A Snapshot of the Shifting Landscape of Noncredit Community College Workforce Education*: https://go.rutgers.edu/l8dzdzkm

*Its Own Standard: Approaches to Quality in Community College Noncredit Workforce Education*: https://go.rutgers.edu/tuy1h2o3

*Career Decision Making and Community College Noncredit Students*: https://go.rutgers.edu/pcqio9jf

To learn more about Quality in Noncredit Education project, scan the QR code or visit: https://go.rutgers.edu/4l15shwu

## *Mapping the Non-Degree Credential Market:*

*Landscape Scan of National Influences on NDC Quality* https://go.rutgers.edu/LandscapeScan

*Building a System for Non-Degree Credential Quality: A Landscape Scan of National Influences in NDC Quality* https://go.rutgers.edu/buildingNDC

*Making Sense of Quality in The NDC Marketplace – Implications for Policymakers and Practitioners* https://go.rutgers.edu/QualityNDC

To learn more about Quality in Noncredit Education project, scan the QR code or visit: https://go.rutgers.edu/4l15shwu

## *Review of the Evidence of Noncredit Education:*

*Review of Recent Research on Noncredit Outcomes:* https://go.rutgers.edu/NCoutcomes

To learn more about our *Review of the Evidence of Noncredit Education*, scan the QR code or visit https://go.rutgers.edu/dzlk1ljk

RUTGERS–NEW BRUNSWICK
Education and Emp
Research Center
School of Management and Labo

# NONCREDIT RESEARCH COLLABORATIVE

The Noncredit Research Collaborative brings together leading researchers focused on noncredit education. We seek to:

- Work with states and colleges to conduct rigorous research to build core evidence about noncredit education.
- Help build data infrastructure and analytic capacity to inform policy and practice on noncredit education.
- Serve as a hub to disseminate research and information on noncredit education.

Our ultimate goal is to ensure that noncredit education benefits students and promotes economic opportunities.

**Peter Bahr,** University of Michigan

**Mark D'Amico,** UNC Charlotte

**Michelle Van Noy,** Rutgers

**Di Xu,** UC Irvine

Please visit our website for information in one place on our research on noncredit education:

https://noncreditresearch.org/

RUTGERS UNIVERSITY

# For More Information on EERC…

Contact Michelle Van Noy,
mvannoy@rutgers.edu

Visit the EERC Website:
http://smlr.rutgers.edu/eerc

Join our mailing list:

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

# NEXT STEPS & CLOSING REMARKS

**Catherine Frugé Starghill**

**Vice President,**
**New Jersey Council of County Colleges**

Executive Director,
New Jersey Community College Consortium for Workforce & Economic Development

**Aaron Fichtner**

**President,**

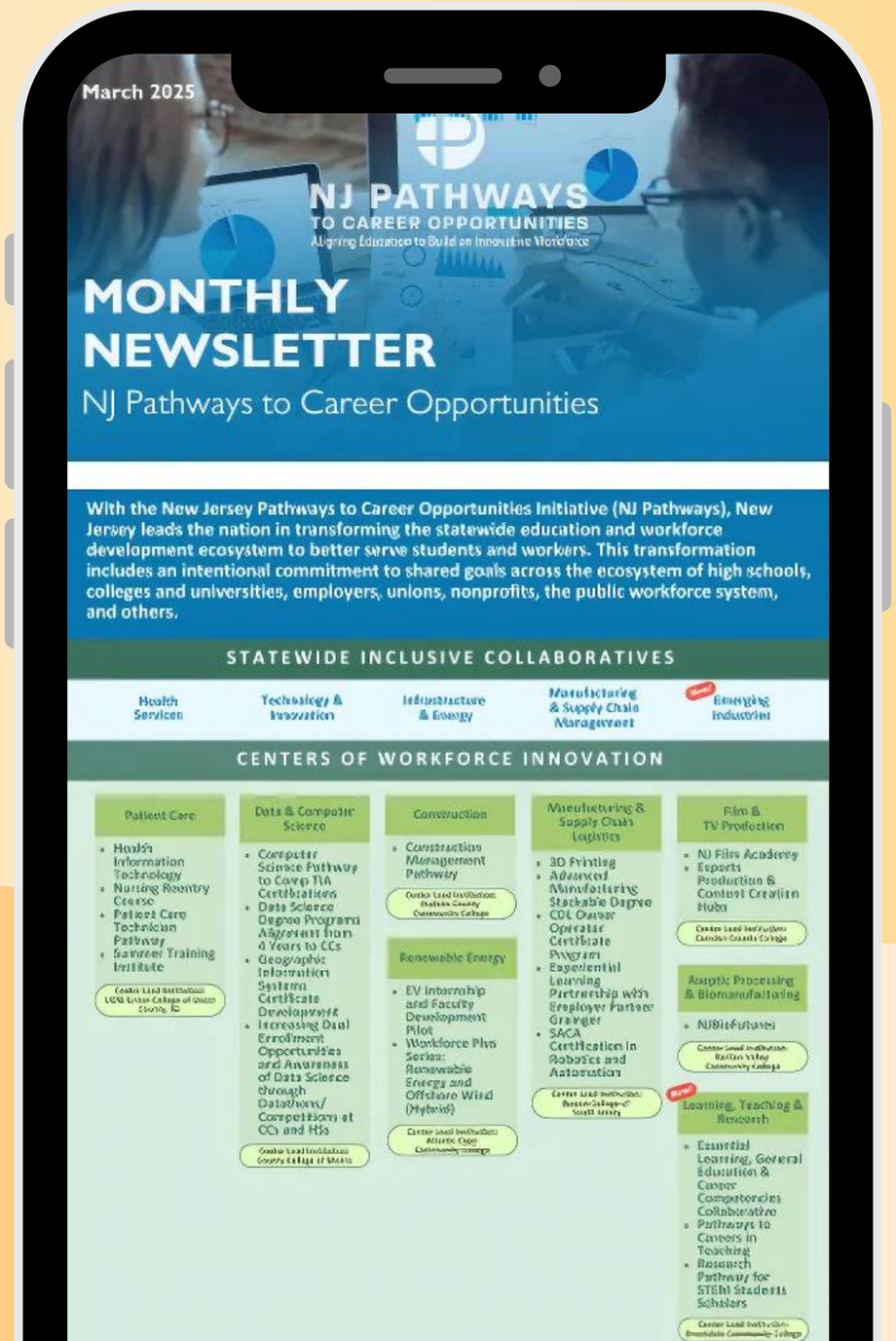
New Jersey Council of County Colleges

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All

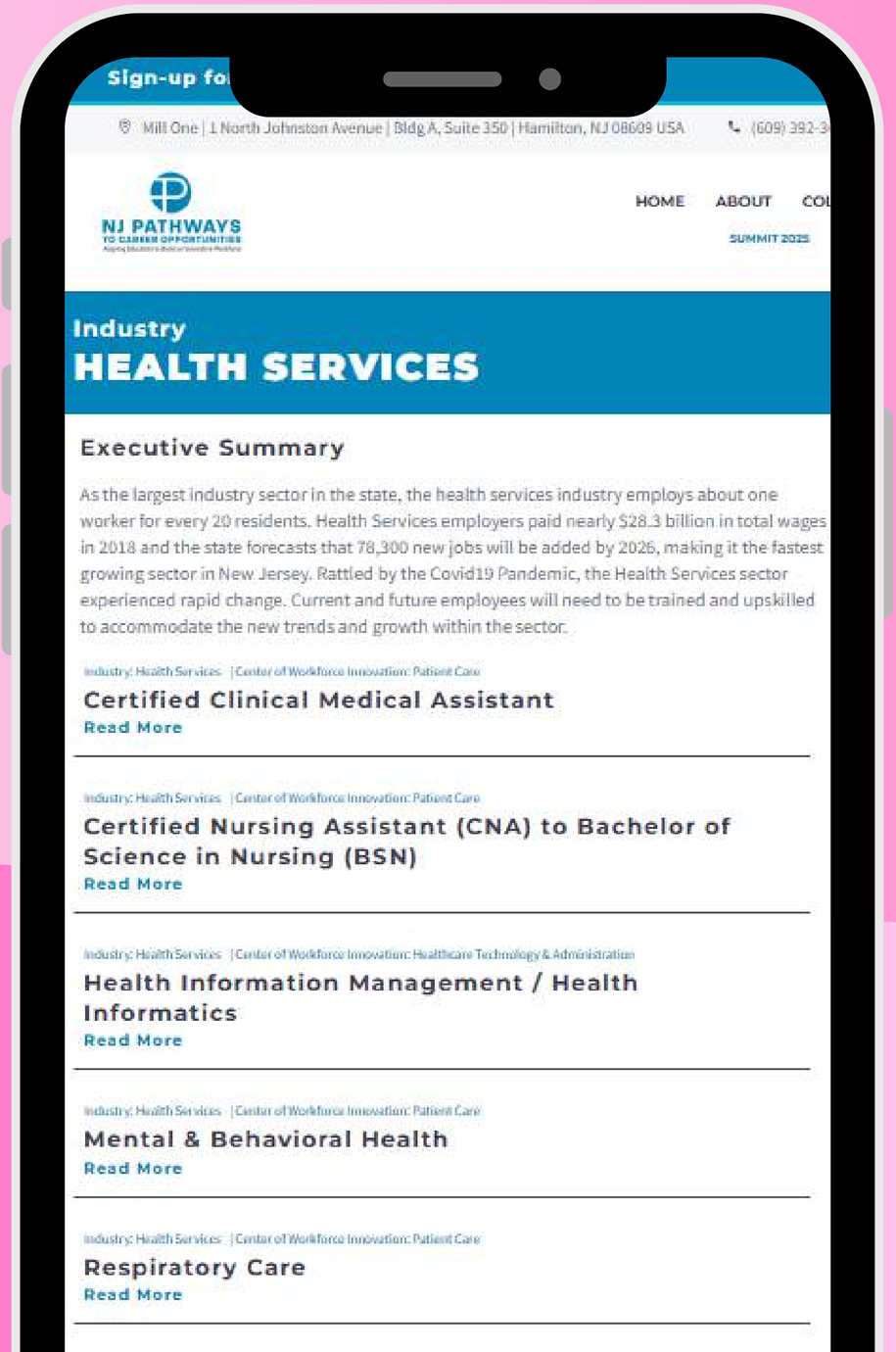
# SIGN UP FOR THE NJ PATHWAYS NEWSLETTER

## ACCESS ARCHIVED ISSUES



# VISIT THE NJ PATHWAYS REPOSITORY—EXPLORE RESOURCES POWERING EDUCATION AND WORKFORCE INNOVATION IN NEW JERSEY

## ACCESS NJ PATHWAYS REPOSITORY



NJ PATHWAYS TO CAREER OPPORTUNITIES
Aligning Education to Build an Innovative Workforce
SUMMIT 2025

# JOIN THE NJ PATHWAYS MOVEMENT

# NJ PATHWAYS TO CAREER OPPORTUNITIES SUMMIT 2025

## Innovate, Educate, Elevate: Pathways for All