

State of New Jersey
Office of the Secretary
of Higher Education
New Jersey Community
College Consortium
for Workforce and
Economic Development
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Data Analytics Career Pathways

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EXECUTIVE SUMMARY

In a rapidly changing world and intensely competitive global economy, New Jersey's post-secondary institutions are foundations of higher education and economic opportunity, able to reach a significant proportion of the state's population and offer affordable, high quality education that serves the complex needs of students and employers. New Jersey's post-secondary institutions are uniquely positioned to help the economy grow, industries thrive, and people succeed in an era of rapid economic, social, and technological change.

For almost its entire history, New Jersey's highly educated residents have been the state's most important economic advantage. New Jersey's status as a high-tech, high-wage state cannot be sustained over the coming decade without a skilled workforce to support it especially in an era when rapid evolution in technologies and business models, within the private sector and public sector alike, are experiencing extraordinary changes in the workforce skills they need to compete, thrive, and grow. Due to data explosion powered by new technologies and leading to "smarter products," economists are expecting 20% job growth in data analysis occupations from 2018 to 2028.

In order to meet this industry demand, post-secondary institutions must turn their attention to build stackable, industry-valued credentials by designing and offering robust and inclusive career pathways that are continuously assessed, that incorporate high school collaborations, that allow for seamless transitions between non-credit and credit programs, and that include innovative industry partnerships.

Key Components of a Career Pathway:

- High school to post-secondary pathways, including dual enrollment and pathways to post-secondary vocational programs;
- Training programs offered by community-based organizations and pathways to post-secondary education and credentials;
- Apprenticeship programs (with a focus on degree apprenticeships and work-based learning models);
- Non-credit training programs and pathways to post-secondary credit programs; and
- Prior Learning Assessments to accelerate credential and degree attainment for adults.

The New Jersey Office of the Secretary of Higher Education and the New Jersey Community College Consortium for Workforce and Economic Development (Workforce Consortium) brought together industry leaders from various New Jersey key industry sectors to gather intelligence and identify key career pathways in data analytics.

An industry advisory working group was formed, comprised of 12 industry leaders across a variety of industries to gain industry intelligence. The advisory group met various times to share insights. Additionally, eight industry leaders completed an online survey to give their feedback on common pathways and key industry-valued credentials for data analytics.

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Throughout the work we gained valuable insights such as:

1. **Data is pervasive.** There is a significant increase in the collection, storage, and analysis of data across most industries.
2. All degree programs should require some foundational level of data analysis and **encourage future workforce to become more data literate.**
3. There are a **large number of occupations** that **require an individual to possess data analytics skills** in various industry sectors.

New Jersey's Next Steps:

1. **Expansion of high school statistics and data analytics programs and alignment of high school curricula with community college pathways:** With limited career and technical education programs in high schools in data and analytics, New Jersey could work to expand career and technical education offerings through dual enrollment programs for high school students, taught by community college faculty, in statistics and data analytics. Such programs could be aligned with community college degree programs to offer seamless transfer pathways, encourage college attendance, and reduce the time to completion of a degree.
2. **Stronger alignment of associate's degree programs to bachelor's degree programs:** Existing associate's degree programs enable students to continue their education at a four-year college or university. Building on existing partnerships, curriculum could be further aligned between community colleges and four-year colleges and universities and formal transfer agreements established to encourage and support continued education.
3. **Development of data analytics courses for non-data analytics / data science majors:** As a result of the pervasive nature of data across many occupations and industries, many individuals will need a basic understanding of statistics and data analytics. Such courses could be tailored to students with varying levels of math and statistics skill and with varying needs for data analytics skills.
4. **Development of a data analytics internship program for college students:** Data analytics is a highly applied field and successful data analysts have a deep understanding of the industry in which they work. A data analytics internship program would provide students at community colleges and four-year colleges and universities with work experiences and opportunities to apply the skills that they have learned in the classroom in a real-world setting.

PATHWAY MAPPING METHODOLOGY

This report, based on input from New Jersey employers, a review of labor market data, a review of relevant national research reports, and an inventory of education and training programs, summarizes these trends in New Jersey and identifies key career pathways in data analytics. This report is designed to inform the decisions of educational institutions, at all levels, as they make decisions about curricula and programs. The report is also designed to create content that can be used to inform the decisions of students and workers related to education and training.

This report, produced by the New Jersey Community College Consortium for Workforce and Economic Development (Workforce Consortium), will also support the efforts of the New Jersey Office of the Secretary of Higher Education to promote stackable, industry-valued credentials by identifying and encouraging the development and enhancement of robust and inclusive data analytics credit and noncredit education and training pathways by the state's institutions of higher education, that are (1) continuously assessed, (2) incorporate high school collaborations, (3) allow for seamless transitions between noncredit and credit courses, and (4) include innovative partnerships with other education partners and industry experts to build a highly skilled, well educated, and the most innovative workforce in the country.

To inform this report, the Workforce Consortium:

- 1** *Established an industry advisory working group with 12 employers across a variety of industries to gather real world, real time industry intelligence to compliment the labor market information from government sources;*
- 2** *Conducted interviews with industry experts to discuss common education and training pathways and key industry-valued credentials that are important to their companies and organizations when hiring individuals, as well as what are the key labor market trends in the industry;*
- 3** *Developed a statewide inventory of credential and degree programs across all education institutions that are aligned for the data analytics pathway;*
- 4** *Conducted an employer online survey to gather feedback from eight employers on common pathways and key industry-valued credentials from a broader group of employers; and*
- 5** *Analyzed labor market data from government sources to inform the development and enhancement of new and existing data analytics pathways.*

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DATA ANALYTICS IN A GLOBAL ECONOMY

In the past decade, we have experienced a data explosion powered by new technologies and leading to “smarter” products and more informed decisions in our personal and professional lives, business, government, education, and local communities. A massive amount of data is created each day through in-person, virtual, and electronic transactions and activities. This has led to an era of large amounts of information or data that when organized and analyzed, yields valuable insights into every decision made across the globe every single day.

Due to the rapid evolution of technologies and business models, the private sector and public sector alike are experiencing extraordinary changes in the workforce skills they need to compete, thrive, and grow. Consequently, employers are expecting to face significant skills gaps in the area of data analytics, as demand for individuals who can analyze and manage data outpaces the supply of individuals with those skills.¹

Industry experts from New Jersey, through meetings, interviews and an online survey, identified three key trends that are shaping careers in data analytics:



We are squarely within the era when **data is pervasive** and there is a significant increase in the collection, storage, and analysis of data across most industries. From public health to entertainment, agriculture to travel, banking to cybersecurity, data is collected, stored, analyzed, and used to make predictions and decisions that impact our everyday lives.



More than ever almost all **organizations use data analytics to guide business decisions**. Predictive analytics suggest what could happen in response to changes to the business, and prescriptive analytics indicate how the business should react to these changes. The use of data analytics drives more strategic decisions, which is presumed to yield favorable outcomes.



Occupations specifically engaged directly in data analysis are expected to grow significantly in the years ahead. According to the U.S. Bureau of Labor Statistics, **data analysis jobs will see a 20% growth from 2018 to 2028**, which is much faster than the average growth of other occupations. This significant increase in data analytics jobs is driven, in part, by organizations across all industries needing to make faster, smarter, and more effective decisions in real time.

While employment is relatively small in specific data scientist and mathematical science occupations, a significantly larger number of individuals in New Jersey are employed in occupations closely related to data analytics.

According to the U.S. Bureau of Labor Statistics, New Jersey employs 1,770 individuals as data scientists and in other mathematical science occupations. The annual mean wage for an individual in these occupations is \$116,250 in New Jersey, higher than the national average.²

¹ Agrawal, Sapana, et al. Beyond Hiring: How Companies are Reskilling to Address Talent Gaps (McKinsey & Co., 2020).

² U.S. Bureau of Labor Statistics – Occupational Employment and Wages

New Jersey has more than 25,000 companies and other organizations that hire individuals either in data analytics occupations or occupations that requires data analytics skills to perform their job duties. Key industries in New Jersey that hire individuals with data analysis skills include the following (see Appendix A.):

- 1.** Information Technology
- 2.** Health Services (e.g., Health Information Technologists and Medical Registrars)
- 3.** Life Sciences – Pharmaceutical, Biopharmaceutical and Medical Devices (e.g., Clinical Research Coordinators)
- 4.** Advanced Manufacturing (e.g., Chemical Technicians and Loss Prevention Managers)
- 5.** Financial Services (e.g., Financial Managers and Investment Fund Managers)
- 6.** Retail, Hospitality, and Tourism (e.g., Human Resources Assistants)
- 7.** Infrastructure (e.g., Water Resource Specialists)
- 8.** Transportation, Logistics and Distribution

CRITICAL SKILLS NEEDED FOR CAREERS IN DATA ANALYTICS

Employers report, in the working group, in the survey, and in interviews that individuals in the data analytics career pathway must possess key essential skills, key technical skills, and computer skills.

Technical Skills

Statistical Modeling

Data Visualization

Data Storytelling

Computer Skills

Tableau

Python

SQL

Microsoft Excel

Essential Skills

Problem Solving

Critical Thinking

- **Technical skills:** Data analytics occupations require solid and extensive mathematical and statistical skills, including **statistical modeling** and exploratory data analysis. Individuals in these occupations are required to integrate data from multiple sources and to work with sometimes imperfect data, requiring **data cleansing and blending skills**. In addition, individuals in these occupations must have **data presentation and storytelling** and **data visualization skills** as they are expected to communicate their conclusions and findings to audiences who often have more limited statistical skills.
- **Computer skills:** Data analytics professionals must have strong **programming skills**, familiarity with statistical tools and **ability to use key software**, including **Excel, Tableau, Python, and SQL**.³
- **Essential skills:** Employers report that individuals in data analytics careers **must have strong critical thinking and problem-solving skills**. Data analytics professionals need to have strong “can do attitude” and an “interest in improving skills,” as the field is constantly changing. Data analysts also need strong communication skills.

Seven occupations were identified in the data analytics career pathways through the working group, interviews, and employer survey. Employers were asked to assess the importance of each occupation to their company's hiring needs.

FIGURE 1. Occupations Critical for Employment within a Data Analytics Career Pathway (number represents the significance of each occupation, 1 being most critical and 7 being least critical)

1. Data Scientist
2. Data Analyst
3. Data Engineer
4. Marketing Analyst
5. Business Intelligence Analyst
6. Quantitative Analyst
7. Database Administrator

Further, seven degrees and credentials were identified in the data analytics career pathways through the working group, interviews, and employer survey. Employers were asked to assess the importance of each degree or credential to their company's hiring needs.

FIGURE 2. Degrees and Credentials Critical for Employment within a Data Analytics Career Pathway (number represents the significance of each degree and credential, 1 being most critical and 7 being least critical)

1. Associate Degree in Data Science
2. Associate Degree in Computer Science
3. Certified Analytics Professional
4. Bachelor Degree in Data Science
5. Certificate of Professional Achievement in Data Sciences
6. Bachelor Degree in Computer Science
7. Data Visualization Certificate Program

ESTABLISHING A CAREER IN DATA ANALYTICS AT ANY CREDENTIAL

Based on the industry advisory working group and research on data analytics careers, the following career pathway map was created. This career pathway map is designed to be a general guide for students and jobseekers in an occupation field related to data analytics. The information in the career map can be utilized by institutions with students at any education level, from high school diploma to graduate degree, and to get them started on their career journey.

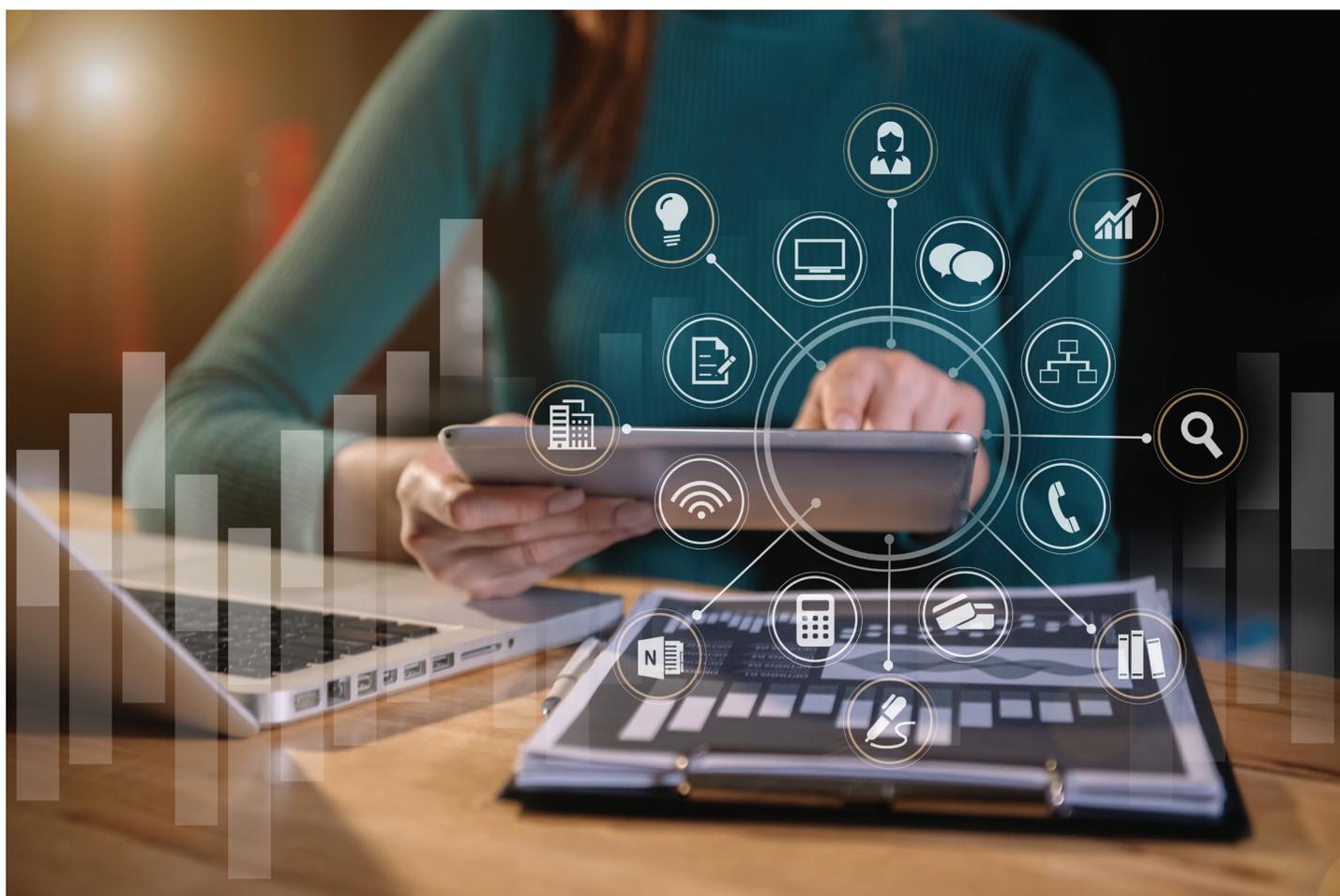
OCCUPATIONS	DEGREES	CREDENTIALS
Graduate Degree		
1. Data Scientist	Master's Degree in Data Science, Data Analytics	<ul style="list-style-type: none"> • Associate Certified Analytics Professional • Certified Analytics Professional
Bachelor's Degree		
1. Quantitative Analyst 2. Marketing Analyst 3. Business Intelligence Analyst	Bachelor's Degree in Data Science Bachelor's Degree in Computer Science, Data Analytics	
Associate's Degree		
1. Data Analyst	Associate's Degree in Data Science Associate's Degree in Database Programming and Administration	

Occupations Requiring a High School Diploma

All data analytics occupations require at least an associate's degree. However, high schools can play a key role in helping to prepare students for further education in data analytics. While all high schools in the state offer a full series of mathematics classes and many offer students an introduction to statistics, only one high school in New Jersey provides a career and technical education program related to data analytics and funded by the federal Perkins program. This program does not prepare students to immediately work as data analysts but does prepare students to continue their education at a college or university.

TABLE 1. Career and Technical Education Program in Data Analytics in a New Jersey High School

Institution Name	Credential/Degree Type	Program Name
Burlington City Public Schools	-	Data Processing and Data Processing Technology/Technician



Occupations Requiring an Associate's Degree

All data analytics occupations require at least an associate's degree. This program does prepare students to immediately work as data analysts and does prepare students to continue career progression after attaining further education at a college or university.

Occupation 1: Data Analyst

Education requirements:

Associate's degree in Data Science

Associate's degree in Database
Programming and Administration

Associate's degree in Mathematics
with a Data Science Option

Data Analysts include a wide range of occupations, often with different titles in different industries that form that foundation of the data analytics career pathway. While employers have typically required a bachelor's degree for new hires, there is an increasing openness to hiring individuals with specific and focused degrees at the associate's degree level.

Data analysts are responsible for managing data for the business or organization and conducting statistical analysis to inform key business decisions. Data analysts are also responsible for making the data usable by key decision makers and must have strong data visualization skills, basic programming and database management skills, the ability to use key software packages, and an understanding of the business.

Nine of the state’s community colleges offer credit bearing programs in the field of data analytics. Four of the community colleges offer associate’s degrees in data science and related fields.

TABLE 2. Credit-Bearing Programs in Data Analytics in New Jersey Community Colleges

Institution Name	Credential/Degree Type	Program Name
Atlantic Cape Community College	Certificate of Achievement	Oracle SQL Programming and Database Design Specialist
Bergen Community College	Pre-Associate Certificate	Database Programming and Administration
Bergen Community College	Associate’s Degree	Database Programming and Administration
Brookdale Community College	Associate’s Degree	Mathematics/Science with Data Science Option
Camden County College	Certificate of Achievement	Relational Database Management System Using Oracle
Camden County College	Pre-Associate Certificate	SQL Analyst
Camden County College	Associate’s Degree	Data Science
County College of Morris	Certificate of Achievement	Data Analytics
County College of Morris	Certificate of Achievement	Data Visualization
Essex County College	Pre-Associate Certificate	Database System Administration
Mercer County Community College	Pre-Associate Certificate	Database Administration
Middlesex College	Pre-Associate Certificate	Data Science and Analytics
Middlesex College	Associate’s Degree	Data Science and Analytics
Raritan Valley Community College	Pre-Associate Certificate	Database – Oracle Emphasis Certificate

Community colleges also offer non-credit programs designed to provide students with specific skills, including data analytics and programming. Two primary examples of these programs are as follows:

TABLE 3. Selected Non-Credit Programs Offered at New Jersey Community Colleges⁴

Institution Name	Program Name	Length of Program
Brookdale Community College	Certificate in Data Analysis	4 – 11 Weeks
County College of Morris	Data Analytics/Visualization Certificate with R and Python Programming	3 – 5 Months

⁴ The New Jersey Training Opportunities (NJTOPPS) – New Jersey Eligible Training Provider List (ETPL)

Occupations Requiring a Bachelor's Degree

All data analytics occupations require at least an associate's degree. However, individuals aiming for a career progression in data analytics career field have to earn a bachelor's degree to fulfill many companies' hiring requirement criteria. Below occupations require individuals to earn a bachelor's degree:

Occupation 1: Quantitative Analyst

Education Requirements:

Bachelor's Degree in Business, Economics, Statistics, and Data Science

Quantitative analysts, found principally in the financial services industry or in the financial departments of larger companies, use data to inform business and investment decisions. Quantitative analysts must have a strong knowledge of business and economics.

Occupation 2: Marketing Analyst

Education Requirements:

Bachelor's Degree in Business, Marketing, Statistics, Data Science

Marketing analysts, who work for marketing and advertising agencies and for companies with marketing departments, use data to help inform business development, outreach, and advertising efforts.

Occupation 3: Business Intelligence Analyst

Education Requirements:

Bachelor's Degree in Business, Economics, Statistics, Data Science

A business intelligence analyst's most fundamental job is to find patterns — and value — in their company and industry data. These analysts are employed by both medium and large companies in a wide variety of industries.

Occupation 4: Data Engineer

Education Requirements:

Bachelor's Degree in Computer Science, Data Science

Data engineers are responsible for managing large datasets and building the infrastructure needed to both integrate and connect complex data systems and to make that data available to inform decisions.

TABLE 4. Credit-Bearing Programs in Data Analytics in New Jersey Four-Year Colleges and Universities

Institution Name	Credential/Degree Type	Program Name
Berkeley College	Bachelor's	Business Data Science
Montclair State University	Bachelor's	Data Science
New Jersey City University	Bachelor's	Business Analytics and Data Science
Rowan University	Bachelor's	Computer Science/Data Analytics

Occupations Requiring a Master's Degree

To become a data scientist, an individual needs to earn a master's degree and compliment it with industry-valued credentials listed in the career pathway above. An individual can start as a data analyst after earning an associate's degree and can become a data scientist if he/she continues the education journey along with gaining necessary experience and learning three different skill areas on the job.

Occupation 1: Data Scientist

Education Requirements:
Master's Degree in Data Science

Data scientists are responsible for performing highly sophisticated statistical analysis to understand trends and predict future outcomes. Data scientists must have extensive statistical skills and strong programming skills.

TABLE 5. Master's Programs or Graduate Certificates in Data Analytics in New Jersey Four-Year Colleges and Universities

Institution Name	Credential/Degree Type	Program Name
College of Saint Elizabeth	Master's	Data Science
Fairleigh Dickinson University	Graduate Certificate	Database Administration
Felician University	Graduate Certificate	Data Processing
Montclair State University	Master's	Data Science
New Jersey City University	Master's	Business Analytics and Data
New Jersey Institute of Technology	Graduate Certificate	Data Mining
New Jersey Institute of Technology	Graduate Certificate	Big Data Essentials
New Jersey Institute of Technology	Master's	Data Science
New Jersey Institute of Technology	Doctorate	Business Data Science
Rowan University	Graduate Certificate	Computational Data Analytics
Rowan University	Master's	Data Analytics
Rider University	Graduate Certificate	Information Systems and Data Administration
Rutgers University/New Brunswick	Graduate Certificate	Computational and Data-Enabled Science and Engineering
Stevens Institute of Technology	Graduate Certificate	Database Systems
Stockton University	Master's	Data Science and Strategic Analysis
Thomas Edison State University	Master's Certificate	Data Analytics
Thomas Edison State University	Master's	Data Science and Analytics

INDUSTRY-VALUED CREDENTIALS

Based on feedback gathered from industry advisory working group meetings, the following industry-valued credentials are important for individuals in more advanced stages of education.

Associate Certified Analytics Professional

Prior Knowledge and Experience Required:

- Hold a MA/MS in related area; and
- Less than three years of professional experience

Organization: INFORMS (International Association for Operations Research & Analytics professionals)

Certified Analytics Professional

Prior Knowledge and Experience Required:

- Three years of experience with MA/MS in related area, or
- Five years of experience with BA/BS in related area, or
- Seven years of experience with any degree in unrelated analytics area

Organization: INFORMS (International Association for Operations Research & Analytics professionals)

NEW JERSEY'S NEXT STEPS

New Jersey has a strong foundation of logistics pathway degree and credential programs offered by colleges and universities. Possible additional enhancements to the data analytics pathway in New Jersey could include the following:

- 1. Expansion of high school statistics and data analytics programs and alignment of high school curricula with community college pathways:** Employers reported consistently that the pervasive nature of data to many industries and occupations will require a significant percentage of workers to have basic knowledge of how to understand data and how to use data to inform decisions. High schools, in partnership with the state, should integrate basic data concepts into existing high school courses when possible.

With limited career and technical education programs in high schools in data and analytics, New Jersey high schools and state government could work to expand career and technical education (CTE) for high school students in data analytics. High schools should consider offerings through dual enrollment program partnerships with community colleges. Such partnerships could include the deliver of data analytics CTE programs for high school students, taught by community college faculty, in statistics and data analytics. Such programs could be aligned with community college degree programs to offer seamless transfer pathways, encourage college attendance, and reduce the time to completion of a degree.

- 2. Stronger alignment of associate's degree programs and bachelor's degree programs:** Existing associate's degree programs enable students to continue their education at a four-year college or university. Building on existing partnerships, curriculum could be further aligned between community colleges and four-year colleges and universities and formal transfer agreements established to encourage and support continued education. The state could convene community colleges and four-year college and university faculty and leadership to share information on data analytics curriculum and to encourage the development of partnerships.
- 3. Development of data analytics courses for non-data analytics / non-data science majors:** As a result of the pervasive nature of data across many occupations and industries, many individuals will need a basic understanding of statistics and data analytics. High schools, community colleges, and four-year colleges and universities should consider developing data analytics courses tailored to students with varying levels of math and statistics skill and with varying needs for data analytics skills.
- 4. Development of a data analytics internship program for college students:** Data analytics is a highly applied field and successful data analysts have a deep understanding of the industry in which they work. Industry associations, employers, and state government should consider establishing a data analytics internship program in partnership with community colleges and four-year colleges and universities. Such a program would provide students with work experience and opportunities to apply the skills that they have learned in the classroom in a real-world setting.

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The Center for Workforce Innovation in Data Science, led by Middlesex College, Camden County College, Brookdale Community College, and County College of Morris, is currently developing a plan for enhancements to curricula at the high school, community college, and four-year college and university level. The Center for Workforce Innovation is one of the 10 Centers established in the Pathways to Career Opportunities Initiative funded by an investment of \$8.5 million in the state budget. The Center will likely receive funding of at least \$300,000 to support the development of curriculum and model agreements. The Center for Workforce Innovation will include high school and four-year college and university partners that will be identified by April 2022. Rutgers University, NJIT, Rowan University, Montclair State University, and other four-year colleges and universities have extensive capacity and expertise in data analytics and all should be connected to the work of the Center for Workforce Innovation.

CONCLUSION

Data analytics is a critical field in New Jersey with career opportunities across a wide array of industries. A strong supply of highly-skilled data analysts, data scientists, and other related positions is critical to the ability of New Jersey companies and governments to operate in an innovative, strategic, and efficient manner. And as data is now pervasive, more and more employees in New Jersey will need to have some basic data analytics skills. This data analytics pathway will help to guide investments and enhancements to the data analytics curricula and will help to inform the career and education decisions of students and workers.

APPENDIX A: Selected Employers Currently Hiring for Data Analytics Related Occupations in New Jersey

Industry Sectors					
Financial Services	Life Sciences	Information Technology, Professional Services and Telecommunications	Infrastructure and Energy	Advanced Manufacturing & Logistics	Health Services
Citi	Sanofi	Verizon	Siemens	Campbell Soup	RWJBarnabas Health
JPMorgan Chase Bank	Johnson & Johnson	VMware	American Water	Mondelez International	Hackensack Meridian Health
TD Bank	Merck	AT&T	First Energy Corp.	L'Oréal	Horizon Blue Cross Blue Shield of New Jersey
Prudential	Novartis	EY	Maersk	LG Electronics	LabCorp
BNP Paribas	Stryker	Cognizant Technology Solutions	PSEG	United Parcel Service (UPS)	Cooper University Health Care
PayPal	Bayer	Wipro	Exelon	Ryder System	Cigna
Barclays	Novo Nordisk	Dow Jones		Samsung Electronics	Quest Diagnostics
UBS	Zoetis	KPMG		Benjamin Moore	University Hospital
BNY Mellon	Thermo Fisher Scientific			BASF Corporation	CarePoint Health
Morgan Stanley	Amneal Pharmaceuticals			Amazon	
BlackRock	Ortho Clinical Diagnostics				

APPENDIX B: Data Analytics Occupations

Below is the occupational crosswalk of occupations that require data analytics skill to perform job responsibilities.⁵

CORE DATA ANALYSIS OCCUPATIONS	
11-3021.00	Computer and Information Systems Managers
15-1211.00	Computer Systems Analysts
15-1242.00	Database Administrators
15-1243.00	Database Architects
15-1243.01	Data Warehousing Specialists
15-2021.00	Mathematicians
15-2041.00	Statisticians
15-2041.01	Biostatisticians
15-2051.00	Data Scientists
43-9021.00	Data Entry Keyers

⁵ O*NET Online – Education Crosswalk - Codes or Titles from 2020 Classification of Instructional Programs (CIP).

OCCUPATIONS THAT USE DATA ANALYSIS SKILLS

11-1031.00	Legislators	15-1299.03	Document Management Specialists
11-3031.00	Financial Managers	15-1299.04	Penetration Testers
11-3031.01	Treasurers and Controllers	15-1299.05	Information Security Engineers
11-3031.03	Investment Fund Managers	15-1299.06	Digital Forensics Analysts
11-9111.00	Medical and Health Service Managers	15-1299.07	Blockchain Engineers
11-9121.00	Natural Sciences Managers	15-1299.08	Computer Systems Engineer/Architects
11-9121.01	Clinical Research Coordinators	15-1299.09	Information Technology Project Managers
11-9121.02	Water Resource Specialists	15-2051.01	Business Intelligence Analysts
11-9199.00	Managers, All Other	15-2051.02	Clinical Data Managers
11-9199.01	Regulatory Affairs Managers	19-2031.00	Chemists
11-9199.02	Compliance Managers	19-3033.00	Clinical and Counseling Psychologists
11-9199.08	Loss Prevention Managers	19-3039.00	Psychologists, All Other
11-9199.09	Wind Energy Operations Managers	19-3039.02	Neuropsychologists
11-9199.10	Wind Energy Development Managers	19-3093.00	Historians
11-9199.11	Brownfield Redevelopment Specialists and Site Managers	19-3094.00	Political Scientists
13-1111.00	Management Analysts	19-3099.00	Social Scientists and Related Workers, All Other
13-1161.00	Market Research Analysts and Marketing Specialists	19-3099.01	Transportation Planners
13-1161.01	Search Marketing Strategists	19-4031.00	Chemical Technicians
13-2051.00	Financial and Investment Analysts	19-4061.00	Social Science Research Assistants
15-1211.01	Health Informatics Specialists	25-1021.00	Computer Science Teachers, Postsecondary
15-1221.00	Computer and Information Research Scientists	25-1022.00	Mathematical Science Teachers, Postsecondary
15-1231.00	Computer Network Support Specialists	25-4011.00	Archivists
15-1241.00	Computer Network Architects	29-2072.00	Medical Records Specialists
15-1241.01	Telecommunications Engineering Specialists	29-9021.00	Health Information Technologists and Medical Registrars
15-1251.00	Computer Programmers	33.3021.06	Intelligence Analysts
15-1252.00	Software Developers	33-3021.00	Detectives and Criminal Investigators
15-1253.00	Software Quality Assurance Analysts and Testers	33-3021.02	Police Identification and Records Officers
15-1299.00	Computer Occupations, All Other	43-4161.00	Human Resources Assistants, Except Payroll and Timekeeping
15-1299.01	Web Administrators		
15-1299.02	Geographic Information Systems Technologists and Technicians		



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CIP Code	CORE DATA ANALYSIS INSTRUCTIONAL PROGRAMS
11.0301	Data Processing and Data Processing Technology/Technician
11.0601	Data Entry/Microcomputer Applications, General
11.0501	Computer Systems Analysis/Analyst
11.0802	Data Modeling/Warehousing and Database Administration
30.7001	Data Science, General
30.7101	Data Analytics, General
30.7103	Data Visualization

CIP Code	RELATED DATA ANALYSIS INSTRUCTIONAL PROGRAMS
27.0103	Analysis and Functional Analysis
27.0104	Geometry/Geometric Analysis
30.1202	Cultural Resource Management and Policy Analysis
30.2601	Cultural Studies/Critical Theory and Analysis
30.7102	Business Analytics
30.7104	Financial Analytics
40.0502	Analytical Chemistry
42.2814	Applied Behavior Analysis
43.0408	Law Enforcement Intelligence Analysis
44.0501	Public Policy Analysis, General
44.0502	Education Policy Analysis
44.0503	Health Policy Analysis
44.0504	International Policy Analysis
51.0721	Disease Registry Data Management
52.0407	Business/Office Automation/Technology/Data Entry

APPENDIX C: Industry Advisory Working Group Companies

Organization/Company/Institution Name
Jasfel Analytics
Wider Circle (Community Healthtech Startup)
Spencer Gifts
AbbVie
Mitsubishi Tanabe
Fulcrum Digital
Optima Global Solutions
Hackensack Meridian Health
Kellogg
Ardagh Group
Rosenberger, North America
Edmund Optics



Office of the Secretary of Higher Education
1 John Fitch Plaza
10th Floor, PO Box 542
Trenton, NJ 08625-0542
609-292-4310