

Online Graduate Programs in Data Analytics

PennState World Campus

A world of possibilities. Online.

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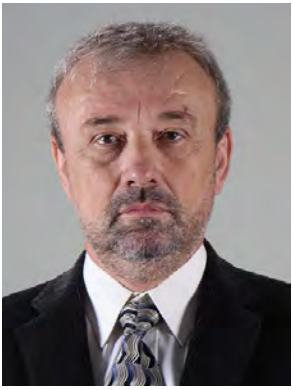
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"We live in an era of big data, and it's no longer enough to merely store and organize data; the imperative now lies in extracting actionable insights. The mission of data analytics programs is to not only teach the design, implementation, and analysis of data systems to gain understanding — it is also to instill leadership qualities essential for guiding teams toward strategic decision-making across a broad array of domains, including business, health care, manufacturing, education, and social media. These high-quality programs are delivered by outstanding faculty who have both experience and expertise in leveraging data."

— Adrian S. Barb, Ph.D.
Director, data analytics programs

Online Graduate Programs in Data Analytics

The volume of data available in every sector of our economy creates opportunities for forecasting, prediction, modeling, simulation, and data-driven decision-making. As a student in a Penn State graduate data analytics program, you can learn how to leverage data to make strategic business decisions that benefit your organization.

Penn State's online programs allow you to study at times and locations that suit your busy schedule, so you can earn respected credentials without setting foot on campus. And because you are able to continue your career while you complete an online program, you can immediately apply course concepts to the everyday activities of your job.

Courses in graduate certificate programs integrate into the master's program, allowing you to earn a stand-alone credential, work on both at the same time, or step up into the master's program after completion of the certificate. In addition to studying the program's core curriculum, you will choose the in-depth base program in data analytics or a specialized option in business analytics or big data systems.





Master of Data Analytics

As a student in this comprehensive master's program, you can gain expertise in data management technologies and techniques to support business decisions across the complete spectrum of analytics activities: descriptive (what happened), diagnostic (why it happened), predictive (what will happen), and prescriptive (what should happen).

You will utilize real data sets in a hands-on learning approach that emphasizes the practical application of theory. As a more experienced data scientist, you can become central to your organization's efforts to leverage big data to gain valuable insights and carve out a competitive advantage, as well as efficiently make strategically sound decisions grounded in real data.

As a graduate, you can pursue jobs such as data modeler; data architect; extraction, transformation, loading (ETL) developer; business intelligence (BI) developer; data warehouse developer; data analyst; systems analyst; financial analyst; and more.

Master's Degree Requirements (30 credits)

9 credits of core courses

9 credits of base or option courses

9 credits of elective courses

3-credit capstone



Program Structure

In addition to studying the program's core curriculum, you will choose the in-depth base program in data analytics or a specialized option in business analytics or big data systems. These options allow you to tailor your studies to a particular area to complement your experience, goals, and existing skill set.

Your data analytics courses will be taught by a multidisciplinary team of highly regarded Penn State faculty who represent a broad spectrum of industry experience.

Base Program

Build expertise as a data scientist as you explore broad, yet in-depth, topics associated with data analytics. Learn to collect, classify, analyze, and model data at a large scale and across domains, using statistics, computer science, machine learning, and software engineering. The final capstone experience is a project-based course in which you will design and implement a data science and analytics system using contemporary tools and techniques. Professionals who work in a quantitative discipline such as science, engineering, or business can benefit from the base program. You can also earn graduate certificates in **Foundations of Data Science, Data Analytics,** and **Data Engineering for Analytics** without taking additional course work. While you will have to apply to the certificates individually, you will not have to pay additional application fees if you have already been accepted into the base program. If you are looking to achieve the most credentials during the completion of your master's degree, the base program is right for you.

View complete program details at:
worldcampus.psu.edu/base-analytics

Big Data Systems Option

Learn to apply big data analytics, data mining techniques, and predictive analytics to meet your organization's business objectives and improve your organization's competitive standing in the marketplace. For your culminating capstone experience, you will apply your knowledge of analytics to the project life cycle, from business problem-framing to modeling life cycle management. Professionals in business, health care, government, information systems design, investments and banking, and manufacturing may find this program particularly useful. You can also earn graduate certificates in **Foundations of Data Science** and **Data Engineering for Analytics** without taking additional course work.

View complete program details at:
worldcampus.psu.edu/big-data

Business Analytics Option

As more data becomes available from transactions, social interactions, and sensors, opportunities emerge for careful analytics and modeling. This option focuses on how you can leverage that data to gain insights that inform business decisions. Prepare to become a business intelligence expert who can transform data in many industries, including government, health care, information systems design and implementation, investments and banking, manufacturing, and more. You can also earn graduate certificates in **Foundations of Data Science** and **Business Analytics** without taking additional course work.

View complete program details at: **worldcampus.psu.edu/business-analytics**

Courses

Core Curriculum (9 credits)

Foundations of Predictive Analytics

Data Mining

Applied Statistics

Electives (choose 9 credits)

Analytics Programming in Python

Applied Time Series Analysis

Data-Driven Decision-Making

Data Visualization

Database Design Concepts

Deep Learning

Enterprise Analytics Strategies

Statistical Analysis System Programming

Regression Methods

Technical Project Management

Decision and Risk Analysis in Engineering





Base Program Curriculum (9 credits)

Data-Driven Decision-Making

Data Visualization

Network and Predictive Analytics for Socio-Technical Systems

Big Data Systems Option Curriculum (9 credits)

Large-Scale Database and Warehouse

Large-Scale Databases for Real-Time Analytics

Data Collection and Cleaning

Business Analytics Option Curriculum (9 credits)

Descriptive Analytics for Business

Predictive Analytics for Business

Prescriptive Analytics for Business

Capstone Experience (3 credits, determined by option)

Design and Implementation of Analytics Systems (base program and Big Data Systems option)

Implementing Analytics for Business (Business Analytics option)

Elective courses may be added or removed to meet market demand.

Tools and Platforms

Master of Data Analytics students are exposed to a broad array of contemporary tools and platforms, including:

Database Framework

Object-relational RDBMS

- Oracle — market-leading RDBMS
- PostgreSQL — open-source RDBMS

Distributed storage solutions

- Apache Hadoop ecosystem
- Apache Cassandra distributed database

NoSQL databases

- MongoDB document-oriented database

Programming Languages and Platforms

- Python — popular language for data analysis
- Java — dominant object-oriented programing language
- Docker — software container platform for easy application deployment

Statistical and Data Mining Packages

- R — open-source statistical computing environment
- SPSS — IBM's popular statistical analysis tools
- SAS — analytics and business intelligence suite
- Rattle — data mining GUI for R

Visualization Tools

- Tableau — interactive data visualization package
- QlikView — business intelligence visualization toolset
- Gephi — open-source network visualization platform

Machine Learning Tool Sets

- KNIME — open-source data analytics, reporting, and integration platform
- Weka — open-source knowledge analysis software

Learning Outcomes

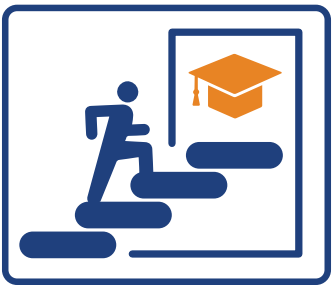
- Learn how to frame analytics problems, identify data sources, determine analytics methodologies, and design and deploy analytics systems at scale.
- Demonstrate fundamental understanding of data mining principles, including supervised and unsupervised machine learning and statistical modeling.
- Effectively communicate data-driven findings to executive stakeholders.
- Gain practical, hands-on experience with contemporary "big data" platforms and tools including R, Python and its libraries, Tableau, SQL and NOSQL databases, Hadoop, and the Apache suite.
- Apply data science and analytics to real data sets across domains.

Earn Valuable Credentials Along the Way

If you choose the base program of the Master of Data Analytics, you can earn three valuable graduate certificates to recognize your new skills and knowledge while you work toward your degree — without any additional course work or application fees. Stackable credentials are a great way to gain new skills and enhance your résumé while working toward a master's degree.

If you choose an option in big data systems or business analytics, you can earn multiple graduate certificates with no additional course work. Note that as a student pursuing one of these options, you will not be eligible for an application fee waiver.

Please refer to the following chart to see which certificates are embedded in each learning path.



Embedded Credentials		Master of Data Analytics		
		Base Program	Big Data Systems Option	Business Analytics Option
Graduate Certificate	Business Analytics			X
	Data Analytics	X		
	Data Engineering for Analytics	X	X	
	Foundations of Data Science	X	X	X

Graduate Certificates

Graduate Certificate in Business Analytics (9 credits)

As a skilled business analyst, you can leverage data to gain insights that inform business decisions. As the data from transactions, social interactions, and sensors increase, opportunities emerge for careful analytics and modeling. Business intelligence experts who can transform data are needed across most industries, including government, health care, information systems design and implementation, investments and banking, manufacturing, and more.

To earn the Graduate Certificate in Business Analytics, you must complete the following courses:

- Descriptive Analytics for Business
- Predictive Analytics for Business
- Prescriptive Analytics for Business

View complete program details at: **worldcampus.psu.edu/bacert**

Graduate Certificate in Data Analytics (9 credits)

This certificate focuses on how to present data in visual and meaningful ways, create analytics and leverage data to determine optimal solutions for business problems, and use quantitative methods to guide and support business decisions. To earn the Graduate Certificate in Data Analytics, you must complete the following courses:

- Network and Predictive Analytics for Socio-Technical Systems
- Data Visualization
- Data-Driven Decision-Making

View complete program details at: **worldcampus.psu.edu/data-analytics-cert**





Graduate Certificate in Data Engineering for Analytics (9 credits)

In this program, you can learn to architect, implement, and monitor data pipelines; assess and communicate requirements; oversee the development of new information systems; and deploy an enterprise-level infrastructure. To earn the Graduate Certificate in Data Engineering for Analytics, you must complete the following courses:

- Data Collection and Cleaning
- Large-Scale Database and Warehouse
- Large Scale Databases for Real-Time Analytics

View complete program details at: **worldcampus.psu.edu/data-engineering-analytics**

Graduate Certificate in Foundations of Data Science (9 credits)

This program explores applying algorithmic methods to discover patterns in large amounts of data, creating analytics solutions for business problems, and using data to predict future trends and events. You can develop knowledge and skills relevant to machine learning, deep learning, and statistical analysis. To earn the Graduate Certificate in Foundations of Data Science, you must complete the following courses:

- Data Mining
- Foundations of Predictive Analytics
- Applied Statistics

View complete program details at: **worldcampus.psu.edu/data-science-foundations**



Step Up to a Master's Degree

Upon successful completion of your certificate, you may be able to apply your earned credits to the Master of Data Analytics, as the certificate courses are built into the degree's curriculum. You can begin by pursuing a certificate and then choose to continue and apply to the master's degree program. If you are accepted to the master's degree program, the credits from the certificate may be applied toward the degree.



"Penn State's business analytics graduate programs provide the perfect road map for passionate data scientists to follow. The application of business intelligence software, big data tools, and an analytical mind in today's business landscape empowers us to bring knowledge, advice, and clarity to an otherwise noisy and confusing data environment."

— Sean S., entrepreneur and business analytics student



Why Penn State?

A Respected, High-Quality Education

In 1892, Penn State founded one of our nation's first correspondence courses; in 1998, we were one of the first major accredited universities to provide online education. We are committed to ensuring that you have access to a quality academic experience, even when you have job and family obligations to fulfill.

Our programs have been developed through a partnership between multiple Penn State departments and Penn State World Campus, a pioneer in providing global online access to a real university education. Your online courses are the same academically challenging courses that are taught on campus, yet they give you the flexibility and convenience to study wherever you are, at times that suit your own schedule.

Faculty

The courses in the data analytics graduate programs are designed and taught by Penn State professors whose teaching and research interests combine academic expertise and industry experience. They are leaders in their fields and experts in the subjects that they teach, and they are committed to making sure you get a quality academic experience in your online programs.

Employer Recognized and Accepted

These online programs carry the same Penn State commitment to quality that is respected by employers everywhere. And when you graduate, your credentials will be the same as any other awarded by Penn State. Penn State World Campus is the real Penn State. The only difference is the way in which the courses are delivered to you.

Begin Your Application Today

Please visit your program's "How to Apply" page to review application deadlines and requirements and begin your application.

Master of Data Analytics

Base Progam: **worldcampus.psu.edu/base-analytics**

Big Data Systems Option: **worldcampus.psu.edu/big-data**

Business Analytics Option: **worldcampus.psu.edu/business-analytics**

Graduate Certificates

Business Analytics: **worldcampus.psu.edu/bacert**

Data Analytics: **worldcampus.psu.edu/data-analytics-cert**

Data Engineering for Analytics: **worldcampus.psu.edu/data-engineering-analytics**

Foundations of Data Science: **worldcampus.psu.edu/data-science-foundations**

Did You Know?

The Penn State World Campus Master of Data Analytics is a collaboration between these Penn State departments and colleges:

- Engineering Division of the School of Graduate Professional Studies, Penn State Great Valley
- Department of Statistics, Eberly College of Science



Contact Us

Admissions Questions

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