



# Graduate Programs in Data Analytics



**PennState**  
World Campus

A world of possibilities.  
Online.

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“We live in the era of big data, and it’s no longer enough to merely store and organize mountains of data; we need to be able to extract wisdom from it. This is the mission of the data analytics programs—to teach the design, implementation, and use of data analytics systems to gain understanding, predict behavior, and make smarter decisions 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 experience and expertise in leveraging data.”

—Dr. Colin J. Neill  
Director, Data Analytics Program

# 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 the graduate data analytics programs at Penn State, 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 the online program, you can immediately apply course concepts to the everyday activities in your job.

Courses in the 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. A separate application is required for each credential.



## Master of Professional Studies in Data Analytics

Choose base program, Business Analytics option,  
or Marketing Analytics option.

(30 credits)

## Graduate Certificates\*

Choose Business Analytics (9 credits) or  
Marketing Analytics (12 credits)

*\*Up to 9 successfully completed credits may transfer up to the master's degree.*

# Master of Professional Studies in 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 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.

## Program Structure

In addition to studying the program's core curriculum, you can elect to follow the in-depth base program in data analytics, or select from a specialized option in Business Analytics or Marketing Analytics. 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.

## 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



## Base Program

Build expertise as a data scientist as you explore the broadest and most in-depth topics associated with data analytics. You can 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.

View complete program details at: [worldcampus.psu.edu/base-analytics](https://worldcampus.psu.edu/base-analytics)

## Business Analytics 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 model life cycle management.

Professionals in business, health care, government, information systems design, investments and banking, and manufacturing may find this program particularly useful.

View complete program details at: [worldcampus.psu.edu/business-analytics](https://worldcampus.psu.edu/business-analytics)

## Marketing Analytics Option

This option delivers the knowledge to help you design, implement, and apply data analysis techniques to solve contemporary and complex marketing challenges.

Your culminating capstone experience will give you the opportunity to apply your knowledge of analytics to support decision-making in the areas of brand positioning and differentiation, pricing and product strategy, brand equity, and customer satisfaction and retention.

Professionals in market research, brand management, and marketing analysis may find this program useful as they transition into a more strategic, higher-level marketing role.

View complete program details at: [worldcampus.psu.edu/daanman](https://worldcampus.psu.edu/daanman)

# 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 Collection and Cleaning

Data Visualization

Deep Learning

Enterprise Analytics Strategies

Large-Scale Databases for Real-time Analysis

Statistical Analysis System Programming

Regression Methods

Technical Project Management

Decision and Risk Analysis in Engineering

## Base Program Curriculum (9 credits)

Database Design Concepts

Large-Scale Database and Warehouse

Data-Driven Decision-Making

## Business Analytics Option Curriculum (9 credits)

Business Strategies for Data Analytics

Predictive Analytics for Business

Prescriptive Analytics for Business

## Marketing Analytics Option Curriculum (9 credits)

Driving Business Success with Marketing

Evaluating Marketing Communications in the Digital World

Data-Driven Customer Acquisition and Retention

## Capstone Experience (3 credits, determined by option)

Design and Implementation of Analytics Systems (base program)

Implementing Analytics for Business (Business Analytics option)

Analytics for Brand Management and Customer Experience (Marketing Analytics option)

Elective courses may be added or removed to meet market demand. View the most up-to-date program details online at [worldcampus.psu.edu/base-analytics](http://worldcampus.psu.edu/base-analytics)



# Tools and Platforms

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

## Database Framework

Object-relational RDBMS

- › Oracle—marketing 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 programming 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 finding 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.

# 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 from 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:

- › Business Strategies for Data Analytics
- › Predictive Analytics for Business
- › Prescriptive Analytics for Business

View complete program details at: [worldcampus.psu.edu/bacert](https://worldcampus.psu.edu/bacert)

## Graduate Certificate in Marketing Analytics (12 credits)

Develop a highly valued skill set to address challenges related to customer acquisition, management, and retention; brand evaluation and management; product and pricing assessment; digital marketing communications; social media influence; and customer experience and satisfaction.

As a student, you can learn to evaluate meaningful metrics, and then successfully communicate how to leverage data to drive product development, new market expansion, customer loyalty, and marketing innovation.

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

- › Driving Business Success with Marketing Analytics
- › Evaluating Marketing Communication in the Digital World
- › Data-Driven Customer Acquisition and Retention
- › Analytics for Brand Management and Customer Experience

View complete program details at: [worldcampus.psu.edu/mktgan](https://worldcampus.psu.edu/mktgan)



## 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 Professional Studies in Data Analytics, as the certificate courses are built into the degree's curriculum. You can begin by pursuing the certificate and then choose to continue and apply to the master's degree program. If you are accepted to the master's degree program, 9 credits from the certificate may be applied toward the degree.



“Penn State’s Business Analytics Graduate Certificate and Master of Professional Studies in Data Analytics 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  
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 Professional Studies

- › Base program: [worldcampus.psu.edu/base-analytics](https://worldcampus.psu.edu/base-analytics)
- › Business Analytics option: [worldcampus.psu.edu/business-analytics](https://worldcampus.psu.edu/business-analytics)
- › Marketing Analytics option: [worldcampus.psu.edu/daanman](https://worldcampus.psu.edu/daanman)

Graduate Certificate in Business Analytics:  
[worldcampus.psu.edu/bacert](https://worldcampus.psu.edu/bacert)

Graduate Certificate in  
Marketing Analytics:  
[worldcampus.psu.edu/mktgan](https://worldcampus.psu.edu/mktgan)

Please visit our website for a more detailed description of the requirements and application procedure:  
[worldcampus.psu.edu/admissions](https://worldcampus.psu.edu/admissions)



## Did You Know?

The Penn State World Campus Master of Professional Studies in Data Analytics is a collaboration of these three 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
- › Departments of Marketing and Supply Chain and Information Systems, Smeal College of Business



# Contact Us

## Admissions Questions

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[worldcampus.psu.edu/admissions](http://worldcampus.psu.edu/admissions)



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