DATA ANALYTICS

Graduate Program Head	Raghu Sangwan
Program Code	DAAN
Campus(es)	Great Valley (M.D.A., M.S.)
	World Campus (M.D.A.)
Degrees Conferred	Master of Science (M.S.)
	Master of Data Analytics (M.D.A.)
The Graduate Faculty	View (https://secure.gradsch.psu.edu/gpms/?searchType=fac&prog=DAAN)

Penn State Great Valley offers two graduate programs that cultivate the skills to collect, classify, analyze, and model data: the Master of Data Analytics (MDAAN) and the Master of Science in Data Analytics (MSDAAN). Both programs are STEM designated.

The Master of Science in Data Analytics (MSDAAN) degree is a research-oriented graduate degree program focused on applying predictive and prescriptive analytics to problems across domains. The program will provide students the skills necessary to frame problems in analytical terms amenable to data analysis; identify the datasets necessary to address the problem; the techniques appropriate to reveal the insight sought, and present that insight to stakeholders.

The MSDAAN curriculum is delivered in residence at the School of Graduate Professional Studies (Great Valley).

The Master of Data Analytics (MDAAN) degree is an interdisciplinary master's program that provides students the skills required to collect, classify, analyze, and model data at large and ultra-large scales and across domains using statistics, computer science, machine learning, and software engineering.

The MDAAN curriculum is delivered both in residence at the School of Graduate Professional Studies (Great Valley) and online through the Penn State World Campus.

Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (https://gradschool.psu.edu/graduate-admissions/how-to-apply/). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (https://gradschool.psu.edu/graduate-education-policies/).

Master of DATA ANALYTICS (M.D.A.)

Admission to the Master of Data Analytics (MDAAN) program will be based on baccalaureate academic records, applicable work experience, and two letters of recommendation from previous professors or supervisors who can attest to the applicant's academic potential. Applicants with an undergraduate degree in a quantitative discipline such as science, engineering, or business may apply. Students from other disciplines will be considered based on prior course work and/or standardized test scores. Applications must include a statement of professional goals, a curriculum vitae or resume, and two letters of recommendation. GRE scores are not required for admission. An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale in the final two years of undergraduate studies is required.

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants.

See GCAC-305 Admission Requirements for International Students (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students/) for more information.

Master of Science (M.S.)

Admission to the Master of Science in Data Analytics program will be based on baccalaureate academic records, applicable work experience, and two letters of recommendation from a previous professor or supervisor who can attest to the applicant's academic potential. Applicants with an undergraduate degree in a quantitative discipline such as science, engineering, or business may apply. Students from other disciplines will be considered based on prior course work and/or standardized test scores. Applications must include a statement of professional goals, a curriculum vitae or resume, and two letters of recommendation. Test scores from the GMAT or GRE exams are required. An undergraduate cumulative grade-point average of 3.0 or better on a 4.0 scale in the final two years of undergraduate studies is required.

The language of instruction at Penn State is English. English proficiency test scores (TOEFL/IELTS) may be required for international applicants. See GCAC-305 Admission Requirements for International Students (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students/) for more information.

Degree Requirements

Master of DATA ANALYTICS (M.D.A.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (https://gradschool.psu.edu/graduate-education-policies/).

The MDAAN degree is conferred upon students who earn a minimum of 30 credits of coursework while maintaining an average grade-point average of 3.0 or better in all course work, including at least 18 credits at the 500 or 800 level (with at least 6 credits at the 500 level). The program curriculum includes 9 credits of core courses, 9 credits of either a selected option or the base program, 9 credits of electives, and a 3-credit capstone course.

Students select to follow either the base program, which prepares them to design and deploy predictive analytics systems, or specialized options in Business Analytics, Marketing Analytics, or Big Data Systems. The base program is available both in residence and online; the options are only available online.

Code	Title	Credits
Required Courses		
STAT 500	Applied Statistics	3
IE 575	Foundations of Predictive Analytics	3
SWENG 545	Data Mining	3
or STAT 557	Data Mining I	
Base Program or Option		*9*
Electives [1]		**9**
Culminating Experience [2]		**3**
Total Credits		**30**

[1] An additional 9 credits of elective courses must be selected from the approved list. The list of approved elective courses is maintained by the graduate program office.

2 All students will complete their program of study with the capstone course corresponding to their chosen option.

All students will complete their program of study with the capstone course corresponding to their chosen option. While each capstone course focuses on problems relevant to their specific domains, they all provide students with an opportunity to apply their knowledge of the theories, methods, processes, and tools of data analytics, learned throughout their program, in a culminating and summative experience. The choice of project topic and exact form will be mutually determined by the instructor and each student. A written paper based on the applied project is required and must contain project description, analysis, and interpretation of its findings. Students are encouraged to upload their capstone projects to be available publicly via ScholarSphere and to participate in the Graduate Exhibition.

Base Program
(Offered at Penn State Great Valley and through World Campus)

The base program will create graduates who can design, deploy, and manage the technology infrastructure and data analytical processes of predictive analytics including data aggregation, cleaning, storage, and retrieval. These graduates will work in positions that require them to design and maintain data analytics systems and tools such as Data Analyst, Data Scientist, Business Analyst, Quantitative Analyst, or Information Officer.

Code	Title	Credits
Required Courses		
DAAN 881	Data-Driven Decision Making	3
DAAN 871	Data Visualization	3
DAAN 846	Network and Predictive Analytics for Socio-Technical Systems	3
Culminating Experience		
DAAN 888	Design and Implementation of Analytics Systems	3

Big Data Systems Option
(Offered at Penn State Great Valley and through World Campus)

The Big Data System option will create graduates who can select, apply, and interpret a variety of data analytic methods and data visualization techniques to business related problems. These graduates will work in positions that require them to design and maintain data analytics systems and tools such as Data Modeler, Data Architect, Extraction, Transformation, Loading (ETL) Developer, Business Intelligence (BI) Developer, Data Warehouse Developer and Data Analyst.

Code	Title	Credits
Required Courses		
DAAN 825	Large-Scale Database and Warehouse	3
DAAN 826	LARGE SCALE DATABASES FOR REAL-TIME ANALYTICS	3
DAAN 822	Data Collection and Cleaning	3
Culminating Experience		
DAAN 888	Design and Implementation of Analytics Systems	3

Business Analytics option
(Offered through World Campus)

This option prepares graduates to explore and analyze large data sets to support data-driven business decisions. Target audiences include business analysts, analytic system designers and the data scientists who have a focus on problems arising in the context of business decision-making. The BAN option is organized around the industry-standard rubric of the spectrum of analytics activities: descriptive (what happened), diagnostic (why did it happen), predictive (what will happen) and prescriptive (what should happen).

Code	Title	Credits
Required Courses		
BAN 830	Descriptive Analytics for Business	3
BAN 840	Predictive Analytics for Business	3
BAN 550	Prescriptive Analytics for Business	3
Culminating Experience		
BAN 888	Implementing Analytics for Business	3

Marketing Analytics Option
(Offered through World Campus)

The aim of this option is to convey how marketing analytics are (1) applied within organizations, (2) conducted, and (3) meaningfully communicated and applied to business decision-making and strategy. The target market would be college graduates that desire to build their skills in marketing analytics functions, but may have little or no formal training in marketing analytics. The MAN option will be highly industry applicable, since it is aimed at giving students the core marketing analytics knowledge they will need to successfully apply marketing analytics in today's data-driven organizations.

Code	Title	Credits
Required Courses		
MKTG 811	Driving Business Success with Marketing Analytics	3
MKTG 812	Evaluating Marketing Communications in the Digital World	3
MKTG 813	Data-Driven Customer Acquisition & Retention	3
Culminating Experience		
MKTG 814	Analytics for Brand Management and Customer Experience	3

Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (https://gradschool.psu.edu/graduate-education-policies/)

The M.S. degree is an academic degree, which is strongly oriented toward research. To receive the Master of Science degree in Data Analytics, a student must complete at least 30 credits beyond the baccalaureate degree at the 400, 500, 600, or 800 level. At least 18 credits in the 500 and 600 series, combined, must be included in the program.

The program curriculum includes 15 credits of core courses, 9 credits of elective courses, and 6 credits of supervised research. The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

Code	Title	Credits
Required Courses		
STAT 500	Applied Statistics	3
IE 575	Foundations of Predictive Analytics	3

SWENG 545	Data Mining	3
DAAN 501	Analytics Research and Problem Framing	3
DAAN 871	Data Visualization	3
Additional Courses		
An additional 9 credits of elective courses must be selected from the approved list of elective courses maintained by the graduate program office.		9
Thesis Research		
DAAN 600	Thesis Research [1]	6
Total Credits		**30**

[1] Students must take a minimum of 6 credits of DAAN 600.

The thesis work should be an in-depth investigation intended to extend the state of knowledge in some specialty area. For thesis guidelines and time lines, refer to the Penn State Graduate School website (http://gradschool.psu.edu/current-students/etd/).

Minor

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policies listed under GCAC-600 Research Degree Policies (https://gradschool.psu.edu/graduate-education-policies/) and GCAC-700 Professional Degree Policies (https://gradschool.psu.edu/graduate-education-policies/), depending on the type of degree the student is pursuing:

- GCAC-611 Minor - Research Doctorate (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-611-minor-research-doctorate/)
- GCAC-641 Minor - Research Master's (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-641-minor-research-masters/)
- GCAC-709 Minor - Professional Doctorate (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-709-professional-doctoral-minor/)
- GCAC-741 Minor - Professional Master's (https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-741-masters-minor-professional/)

Student Aid

Refer to the Tuition & Funding (https://gradschool.psu.edu/graduate-funding/) section of The Graduate School's website. Students in this program are not eligible for graduate assistantships.

Financial aid for students in on-campus programs is in the form of student loans and a limited number of small scholarships, as described on the Penn State Great Valley website (https://greatvalley.psu.edu/tuition-and-financial-aid/).

World Campus students in graduate degree programs may be eligible for financial aid. Refer to the Tuition and Financial Aid section (https://www.worldcampus.psu.edu/tuition-and-financial-aid/) of the World Campus website for more information.

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Data Analytics (DAAN) Course List (https://bulletins.psu.edu/university-course-descriptions/graduate/daan/)

Learning Outcomes
Master of Data Analytics (M.D.A.)

1. **COMMUNICATE:** Graduates will be able to effectively communicate technical knowledge, including ideas, data analysis, findings, or decision justification in written formats in a manner appropriate to the audience.
2. **APPLY/CREATE:** Graduates will be able to analyze large data sets to support data-driven decision making.
3. **KNOW:** Graduates will demonstrate their understanding of technologies used to develop, optimize, and deploy large-scale data analytics techniques.
4. **THINK:** Graduates will be able to discriminate between descriptive, diagnostic, predictive, and prescriptive analytics and the techniques used in each.
5. **PROFESSIONAL PRACTICE:** Graduates will demonstrate knowledge of and ability to practice the professional standards of engineering and professional behavior.

Master of Science (M.S.)

1. **COMMUNICATE:** Graduates will be able to effectively communicate technical knowledge, including ideas, data analysis, findings, or decision justification through oral presentations and writing.
2. **APPLY/CREATE:** Graduates will be able to formulate valid research questions and methods of inquiry to further the discipline of analytics and its application.
3. **KNOW:** Graduates will demonstrate understanding, and application in research, of machine learning and statistical analysis techniques.
4. **THINK:** Graduates will be able to discriminate and determine the application of descriptive, diagnostic, predictive, and prescriptive analytics, and the techniques used in each, to their research problems.
5. **PROFESSIONAL PRACTICE:** Graduates will demonstrate knowledge of and ability to practice the professional standards of analytics research and professional behavior.

Contact

Campus	Great Valley
Graduate Program Head	Raghu Sangwan
Director of Graduate Studies (DGS) or Professor-in-Charge (PIC)	Adrian Sorin Barb
Program Contact	Sharon V. Patterson Penn State Great Valley 30 E. Swedesford Road Malvern PA 19355 svp40@psu.edu (610) 648-3318
Program Website	View (http://greatvalley.psu.edu/academics/masters-degrees/data-analytics/)

Campus	World Campus
Graduate Program Head	Raghu Sangwan
Director of Graduate Studies (DGS) or Professor-in-Charge (PIC)	Adrian Sorin Barb
Program Contact	Sharon V. Patterson Penn State Great Valley 30 East Swedesford Road Malvern PA 19355 svp40@psu.edu (610) 648-3318
Program Website	View (https://www.worldcampus.psu.edu/degrees-and-certificates/data-analytics-base/overview/)