

FUNCTIONAL DATA ANALYTICS, B.S.

Begin Campus: Any Penn State Campus

End Campus: World Campus

Program Description

Functional Data Analytics is an interdisciplinary major that prepares students to be data professionals who are skilled communicators/project managers capable of translating the results of complex data analyses for leaders and decision-makers. Students completing this program will have excellent written, oral, and visual communication/presentation skills and will understand the appropriate application, use of analytical tools, and interpretation of results of analyses. The program begins with courses that provide students with the fundamental communication, mathematical and statistical skills needed to analyze data and communicate the results of the analysis. Three of four data analysis courses covering descriptive, diagnostic, predictive, and prescriptive analytics will be co-taught by a data analytics and an English faculty member to help students learn analytical techniques while practicing essential visualization, oral, and written communication skills. In these courses, students will use real data sets supplied by external partners including businesses or industries. In their second year, students will choose a knowledge domain (e.g., higher education administration, finance, SMART manufacturing, genomics) in which to gain a deeper understanding of domain-specific applications of data analysis. The program will culminate in a two-semester capstone course in which students apply all skills learned in their analytics and domain-specific courses to data provided by an external stakeholder (business, industry, not-for-profit organization, scientific researcher) to address a question posed by that stakeholder.

What is Functional Data Analytics?

The world runs on data, and the people who best understand it—and who can explain it—are essential to any organization. Functional Data Analysts use their deep understanding of the numbers and their communication skills—whether verbal presentations, written reports, or informative graphics—to present a clear, comprehensive story about where an organization has been, where it is now, and where it is headed in the future.

You Might Like This Program If...

- You have both an analytics side and a creative streak, and you think it would be interesting to use both.
- You enjoy looking for—and finding—patterns.
- You're curious about a variety of fields, including business, math, and communications.

Entrance To Major

Entry to the Functional Data Analytics major requires the successful completion of 4 entry-to-major courses: CMPSC 121 or CMPSC 131, DA 101, MATH 110 or MATH 140, and DS 200 or PSYCH 200 or SCM 200 or STAT 200 or STAT 250. Each course requires a C or better grade for successful completion.

Degree Requirements

For the Bachelor of Science degree in Functional Data Analytics, a minimum of 122 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	93-98

18 of the 45 credits for General Education are included in the Requirements for the Major. This includes 3 credits of GH courses; 6 credits of GQ courses; 9 credits of GWS courses.

Per Senate Policy 83.80.5, the college dean or campus chancellor and program faculty may require up to 24 credits of coursework in the major to be taken at the location or in the college or program where the degree is earned.

Requirements for the Major

Each student must earn at least a grade of C in each 300- and 400-level course in the major field.

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
CAS 100	Effective Speech	3
DA 101	Introduction to Data Analytics	3
DA 201W	Descriptive Analytics	4
DA 301	Diagnostic Analytics	3
DA 302W	Predictive Analytics	4
DA 401W	Prescriptive Analytics	4
DA 402	Qualitative Analytics	3
DA 475	Data Analytics Implementation Capstone I	3
DA 476	Data Analytics Implementation Capstone II	3
DIGIT 410	Data Visualization	3
DIGIT/GAME 430	Simulations of Human Behavior	3
ENGL 202C	Effective Writing: Technical Writing	3
IST 230	Language, Logic, and Discrete Mathematics	3
MGMT 409	Project Management for Engineers	3
MIS 415	Social Media Management and Analytics	3
MIS 447	Data Warehousing	3
PHIL 103	Ethics	3
STAT 184	Introduction to R	2
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
CMPSC 121	Introduction to Programming Techniques	3
or CMPSC 131	Programming and Computation I: Fundamentals	
DA 305	Data Ethics and Privacy	3
or DS 435	Ethical Issues in Data Science Practice	
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	

MATH 110	Techniques of Calculus I	4
or MATH 140	Calculus With Analytic Geometry I	
MIS 336	Database Management Systems	3
or IST 210	Organization of Data	
Select 3-4 credits from the following:		3-4
DS 200	Introduction to Data Sciences	
PSYCH 200	Elementary Statistics in Psychology	
SCM 200	Introduction to Statistics for Business	
STAT 200	Elementary Statistics	
STAT 250	Introduction to Biostatistics	

Supporting Courses and Related Areas

Select one special interest concentration from the program approved list of concentrations. 2-16

Select 6 credits from any major field or course, except STAT 100, MATH 200, MATH 201, any ENGL course below ENGL 15, all KINES (GHW) courses, and any MATH course below MATH 83. Petitions for exceptions are available through the applicable program chair. 6

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- **Arts (GA):** 3 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 3 credits
- **Social and Behavioral Sciences (GS):** 3 credits
- **Natural Sciences (GN):** 3 credits

Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

Exploration

- **GN,** may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

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Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

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The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
ENGL 15 or 30H (GWS) ^{*††}	3	CAS 100 (GWS) ^{*††}	3
MATH 110 or 140 (GQ) ^{*†††}	4	DA 101 (GQ) ^{*†††}	3
General Education Course (GA)	3	PHIL 103 (GH) ^{*†}	3
General Education Course (GN)	2	STAT 184 [*]	2
General Education Course (GHW)	1.5	General Education Course (GN/Inter-Domain)	3
	14.5		14

Second Year

Fall	Credits	Spring	Credits
CMPSC 121 or 131 ^{*#}	3	DA 201W [*]	4
IST 230 [*]	3	ENGL 202C (GWS) ^{*††}	3
PSYCH 200, SCM 200, STAT 200, or STAT 250 (GQ) ^{*#}	4	MIS 336 or IST 210 [*]	3
Concentration Course 1	3	Concentration Course 2	3
General Education Course (GHW)	1.5	General Education Course (GS)	3
	14.5		16

Third Year

Fall	Credits	Spring	Credits
DA 301 [*]	3	DA 302W [*]	4

DA 305 [*]	3	DA 402 [*]	3
MGMT 409 [*]	3	DIGIT 410 [*]	3
MIS 447 [*]	3	MIS 415 [*]	3
Concentration Course 3	3	Concentration Course 4	3
	15		16

Fourth Year

Fall	Credits	Spring	Credits
DA 401W [*]	4	DA 476 ^{*2}	3
DA 475 ^{*1}	3	DIGIT 430 [*]	3
Approved Elective	3	Approved Elective	3
General Education Course (GA/GH/GN/GS/Inter-Domain)	3	General Education Course (Inter-Domain)	3
General Education Course (Inter-Domain)	3	General Education Course (GA/GH/GN/GS/Inter-Domain)	3
	16		15

Total Credits 121

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

¹ Course is fall only offering

² Course is spring only offering

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

Career Paths

Skilled professionals who can collect and analyze data, as well as communicate their findings and anticipate future performance, are in demand. Continued growth of "big data" and the data analytics specialty are expected for the foreseeable future in any field that uses data—in other words, in nearly every field.

Contact

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<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-functional-data-analytics-bachelor-of-science-degree> (<https://www.worldcampus.psu.edu/degrees-and-certificates/penn-state-online-functional-data-analytics-bachelor-of-science-degree/>)