FUNCTIONAL DATA ANALYTICS, B.S.

Begin Campus: Any Penn State Campus
End Campus: Erie, 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 analysts 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>93-98</td>
</tr>
</tbody>
</table>

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/students/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS 100</td>
<td>Effective Speech</td>
<td>3</td>
</tr>
<tr>
<td>DA 101</td>
<td>Introduction to Data Analytics</td>
<td>3</td>
</tr>
<tr>
<td>DA 201W</td>
<td>Descriptive Analytics</td>
<td>4</td>
</tr>
<tr>
<td>DA 301</td>
<td>Diagnostic Analytics</td>
<td>3</td>
</tr>
<tr>
<td>DA 302W</td>
<td>Predictive Analytics</td>
<td>4</td>
</tr>
<tr>
<td>DA 401W</td>
<td>Prescriptive Analytics</td>
<td>4</td>
</tr>
<tr>
<td>DA 402</td>
<td>Qualitative Analytics</td>
<td>3</td>
</tr>
<tr>
<td>DA 475</td>
<td>Data Analytics Implementation Capstone I</td>
<td>3</td>
</tr>
<tr>
<td>DA 476</td>
<td>Data Analytics Implementation Capstone II</td>
<td>3</td>
</tr>
<tr>
<td>DIGIT 410</td>
<td>Data Visualization</td>
<td>3</td>
</tr>
<tr>
<td>DIGIT/</td>
<td>Simulations of Human Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202C</td>
<td>Effective Writing: Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>IST 230</td>
<td>Language, Logic, and Discrete Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 409</td>
<td>Project Management for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MIS 415</td>
<td>Social Media Management and Analytics</td>
<td>3</td>
</tr>
<tr>
<td>MIS 447</td>
<td>Data Warehousing</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 103</td>
<td>Ethics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 184</td>
<td>Introduction to R</td>
<td>2</td>
</tr>
</tbody>
</table>

Additional Courses
Additional Courses: Require a grade of C or better

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPSC 121</td>
<td>Introduction to Programming Techniques</td>
<td>3</td>
</tr>
<tr>
<td>or CMPSC 131</td>
<td>Programming and Computation I. Fundamentals</td>
<td></td>
</tr>
<tr>
<td>DA 305</td>
<td>Data Ethics and Privacy</td>
<td>3</td>
</tr>
<tr>
<td>or DS 435</td>
<td>Ethical Issues in Data Science Practice</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS 200</td>
<td></td>
</tr>
<tr>
<td>PSYCH 200</td>
<td></td>
</tr>
<tr>
<td>SCM 200</td>
<td></td>
</tr>
<tr>
<td>STAT 200</td>
<td></td>
</tr>
<tr>
<td>STAT 250</td>
<td></td>
</tr>
</tbody>
</table>

Supporting Courses and Related Areas
Select one special interest concentration from the program approved list of concentrations.
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.

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 advisees’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.
Functional Data Analytics, B.S.

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 3 PHIL 103 (GH) †‡ 3
General Education Course 3 STAT 184 †‡ 2
General Education Course 1.5 General Education Course (GHW) (Inter-Domain) 3

Total Credits 14.5

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 1.5 General Education Course (GHW) (GS) 3

Total Credits 14.5

Third Year

Fall Credits Spring Credits
DA 301 † 3 DA 302W ‡ 4
DA 305 † 3 DIGIT 410 ‡ 3
MGMT 409 † 3 MIS 415 ‡ 3
Concentration Course 3 3 Concentration Course 4 3

Total Credits 15

Fourth Year

Fall Credits Spring Credits
DA 401W † 4 DA 476 ‡ 3
DA 475 † 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

Total Credits 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
3 All students are required to fulfill 45 credits of General Education courses. More information about this requirement can be found on the Baccalaureate Degree General Education Requirements page in the Bulletin (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/).

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**

**Erie**
BLACK SCHOOL OF BUSINESS
281 Burke Center
Erie, PA 16563
814-898-6107
behrendbusiness@psu.edu

https://behrend.psu.edu/school-of-business

**world campus**
BLACK SCHOOL OF BUSINESS
281 Burke Center
Erie, PA 16563
814-898-6107
behrendbusiness@psu.edu