# PROPOSED PROGRAM SUMMARY

**Institution:** University of Kentucky
**Program Name:** Statistics and Data Science
**Degree Destination:** Bachelor of Science

**CIP Code:** 27.0501
**Credit Hours:** 120
**Implementation Date:** 1/15/2024

## Program Description

The proposed program will equip students to execute all stages of data analysis, from data acquisition and exploration to application of statistics and machine learning methods for the creation of data products. Graduates will be prepared to enter the workforce directly or to continue on to graduate-level programs in statistics.

Through this program, students will:

- Develop fundamental statistical knowledge by:
    - formulating problems using the language of probability o represent and quantify error and uncertainty using formal mathematical language
    - evaluating the strength of evidence for empirical claims using statistical inferential theory and methods
    - understanding the differences when analyzing data from observational studies and well-designed experiments ·
- Explore real data modeling questions by:
    - building and assessing quantitative models that solve real world problems in diverse contexts
    - undertaking all stages of a data analysis pipeline – including data wrangling, model exploration, algorithmic modeling, and the creation of insightful data products
    - creating visual summaries of data patterns that are visually compelling, information-rich, accessible, and honest representations of the underlying data and methods
- Build computational fluency through:
    - effectively using professional-level technology tools to create reproducible, comprehensive records of a data analysis pipeline
    - understanding the core components of programming with data, with detailed knowledge of the statistical programming language, R
    - demonstrating the ability to learn emerging programming languages o differentiate between probabilistic and deterministic algorithms
    - understanding how mathematical models are translated as computational algorithms.

- Discuss data outcomes from a statistical perspective by:
    - presenting key statistical ideas both orally and in writing, especially for non-experts o articulate choices within the data analysis pipeline, including in the context of limitations of the data and/or modelling assumptions
    - translating between the context of a real-world problem and data-based considerations
    - constructing captivating deliverables that summarize a data analysis workflow, using fully reproducible methods.

## Connection to Other Programs

Both Eastern Kentucky University and Northern Kentucky University offer undergraduate programs in statistics and related fields, with EKU focusing on data science and statistics and NKU offering traditional statistics and data science programs. EKU's Data Science and Statistics program offers several different program options with the statistics combination being most like the proposed program. This program

option requires three to four credit hours of programming and roughly 35 credit hours in math and statistics.

NKU's statistics program emphasizes methods and regression sequences, requiring 43 credits and offering a wide range of elective courses in math and statistics. NKU does not provide machine learning or data science courses within its statistics program. However, NKU also offers a separate data science degree within its School of Computing and Analytics, requiring 6-9 hours of programming, 15 hours in computer science, 16 hours in data science, and 18 hours in Math and Stats. Statistics students can pursue a minor in data sciences.

The University of Kentucky's proposed program is most like EKU's program and offers more data science courses than NKU's statistics program and more mathematical statistics than NKU's data science program. UK's program also allows for specializations and flexibility to pursue double majors and the university scholar program.

The University of Kentucky's program has strong faculty expertise, significant grant funding through its Predictive Analytics and Data Science Hub, and an established record of constructive collaboration with other units and other universities. Potential areas of collaboration with partner universities, recognizing their geographical proximity in the state, include offering data science workshops for all our combined students, and coordinating capstone/consulting experiences to create more and diverse options.

**Student Demand**

Initial estimates of enrollment are:
Year 1 – 5
Year 2 – 10
Year 3 – 30
Year 4 – 40
Year 5 – 50

**Employment Demand**

Based on criteria such as future growth, salary, and work-life balance, Data Scientist/Statistician is ranked as one of the best jobs by multiple career guidance websites. Current rankings for the occupation of data scientist are close behind and will likely exceed the demand for statisticians in the near future. In its 2020 Emerging Jobs Report, the professional networking and employment platform LinkedIn ranked data scientist third among 15 in a list of emerging jobs in the United States. Hiring of individuals for such roles increased by 46 percent since 2019 and an annual growth rate of new employment opportunities in the field is projected to be 37% annually. The Bureau of Labor Statistics (BLS) and the O*NET Program provide projections for new jobs in statistics and data science that are overwhelmingly positive. Both occupations are identified as having a "Bright Outlook" nationally and for Kentucky over the next 10 years. Much of this projected growth will result from businesses collecting an increasing amount of data from an ever-widening number of sources. In order to analyze and interpret this data, businesses and organizations will need to hire more people specifically trained in such analysis.

**Budget**

The program will be funded based on financial allocation models adopted by UK, and funds generated from these allocations will be reinvested into the program. The proposed program is expected to continue to bring new students to the institutions and has been deemed financially viable by the university.

**Projected Revenue over Next Five Years ($):** $948,827
**Projected Expenses over Next Five Years ($):** $890,100