

Program Approval

I. General Information

A. Institution University of Kansas

B. Program Identification

| | |
|---------------------------------|-------------------------------------|
| Degree Level: | Bachelor's |
| Program Title: | Data Science |
| Degree to be Offered: | Bachelor of Science in Data Science |
| Responsible Department or Unit: | Psychology |
| CIP Code: | 30.0601 |
| Modality: | Face-to-Face |
| Proposed Implementation Date: | Fall 2025 |

Total Number of Semester Credit Hours for the Degree: 120

II. Clinical Sites: Does this program require the use of Clinical Sites? No

III. Justification

The Bachelor of Science (B.S.) in Data Science is aimed at students who are interested in pursuing careers in data science or related fields. The B.S. in Data Science degree is a multidisciplinary undergraduate program that will provide students training in mathematics, computation, and statistics; data collection, management, description, and analysis; communication and project management; ethics; problem solving; and decision making.

The program objective is consistent with a Data Science degree curriculum: to prepare students for a 21st century workforce where data analysis is critical to the functioning of society, business, and education. Upon completion of this major, students will gain technical capabilities, enhanced critical and analytical thinking skills, a well-developed skillset for coding, programming, managing, and interpreting data sets, as well as effective writing, communication, and collaborative working skills.

The combination of social science and data science distinguishes the Data Science degree in the College of Liberal Arts and Sciences. Naive approaches to artificial intelligence and data science replicate the biases present in society (AI Multiple, n.d.). Algorithms are only as good as the training data and assumptions used in the models. The Data Science degree combines data science methods with a social science perspective on the data-generating process. The grounding in social science prepares students with the insights needed to interpret the vast amounts of data being created by social processes, government, political processes, communication, and economic activity. As a result, the Data Science degree will produce well-rounded graduates with technological savvy, preparing them for a labor market that increasingly relies on skills that cannot be replaced by ChatGPT.

This proposed degree advances current work at the University of Kansas funded by the National Science Foundation (NSF). The NSF provided funding for the Kansas Data Science Consortium (KDSC) and a mission to enhance the data science capacity of the workforce in Kansas. Faculty and staff in the KDSC contributed to the curriculum design for the proposed degree. Part of the consortium's work has been to integrate data science into the curriculum across high school, community college, and baccalaureate programs. The curriculum in this major will articulate with courses that exist or will be proposed at community colleges in Kansas to create pathways into the B.S. degree program. Additionally, should this major be approved, work is underway to develop 2+2 agreements to facilitate seamless transfer between community college data science programs and the B.S. in Data Science at the University of Kansas. Current community college partners include data science faculty at Johnson County Community College and Butler Community College.

IV. Program Demand

Market Analysis

According to the Bureau of Labor Statistics (2023), there were 169,000 jobs in data science in 2022, and the expected growth in data science jobs between 2022 and 2032 is 35%. The growth rate in data science jobs is more than three times higher than for other occupations. Data scientists earn an average of \$104,000 per year. According to Lightcast there were 496,000 unique data science job postings between January 2021 and December 2022. Most data scientists have a bachelor's degree.

Five years ago, a bachelor's degree in data science was nearly nonexistent. Currently, over fifty institutions across the country are offering a data science major. In the last year alone, more than a dozen new data science bachelor's degree programs have been launched, reflecting the demand for graduates with a data science skillset.

There are no public universities/colleges in the state of Kansas that offer a B.S. degree with the same CIP Code. The curriculum in this proposal has been developed in collaboration with faculty at UC Berkeley, using their data science bachelor's program as a model. Berkeley's bachelor's program was founded in 2015; within five years it had 900 undergraduate majors, including double majors, and 450 minors. More than 6,000 of the 45,000 Berkeley students take a data science course each year.

In Fall 2022, KU's Psychology department began offering an undergraduate certificate in data science. It enrolled twelve students. In the fall 2024 semester, the number of students has increased to 52.

V. Projected Enrollment for the Initial Three Years of the Program

| Year | Total Headcount Per Year | | Total Sem Credit Hrs Per Year | |
|----------------|--------------------------|-----------|-------------------------------|-----------|
| | Full- Time | Part-Time | Full- Time | Part-Time |
| Implementation | 5 | 0 | 150 | 0 |
| Year 2 | 10 | 0 | 300 | 0 |
| Year 3 | 20 | 0 | 600 | 0 |

Conservative projections are based on interest in the current undergraduate data science certificate, and the demand trends in the field of data science. Many of these students will double-major as the design of the program facilitates students studying data science and another major in the College of Liberal Arts and Sciences, thus enhancing the interest in data science and strengthening majors across campus.

VI. Employment

There are a variety of employment opportunities for students who study for a Bachelor of Science in Data Science. The Lightcast (2022) market analysis report requested by the University of Kansas shows that the target occupations for data science graduates are those listed below:

- Market Research Analysts and Marketing Specialists
- Management Analysts
- Financial Managers
- Postsecondary Teachers
- Financial and Investment Analysts
- Computer Programmers
- Financial Risk Specialists
- Data Scientists
- Statisticians

Mathematical Science Occupations, All Other

Combined, these occupations accounted for 1.69 million jobs in 2019. Between 2019 and 2021, there were 237,143 job openings for these occupations. Across these occupations, the number of jobs grew by 4.8 percent.

The median earnings across these occupations ranges from \$30 per hour to \$60 per hour. For all occupations included in the analysis, the median earnings are \$42.45 per hour and \$88.3k per year.

VII. Admission and Curriculum

A. Admission Criteria

Qualified Admission criteria are used, as this program does not have separate admission requirements.

B. Curriculum

Year 1: Fall

SCH = Semester Credit Hours

| Course # | Course Name | SCH=15 |
|----------|--|--------|
| PSYC 199 | Data I | 3 |
| EECS 138 | Introduction to Computing | 3 |
| | KBOR Core English (SGE) | 3 |
| MATH 101 | College Algebra (KBOR Core Math (SGE)) | 3 |
| | KBOR Core Arts and Humanities (SGE) | 3 |

Year 1: Spring

| Course # | Course Name | SCH=15 |
|----------|-------------------------------------|--------|
| PSYC 399 | Data II | 3 |
| MATH 115 | Calculus I | 3 |
| | KBOR Core English (SGE) | 3 |
| | KBOR Core Communications (SGE) | 3 |
| | KBOR Core Arts and Humanities (SGE) | 3 |

Year 2: Fall

| Course # | Course Name | SCH 16-17 |
|----------|---|-----------|
| MATH 365 | Elementary Statistics | 3 |
| MATH 116 | Calculus II | 3 |
| | KBOR Core Social and Behavioral Sciences (SGE) | 3 |
| | KBOR Core Natural and Physical Sciences (SGE) | 4-5 |
| | KBOR Core Institutionally Designated Global Culture (SGE) | 3 |

Year 2: Spring

| Course # | Course Name | SCH=14 |
|----------|---|--------|
| MATH 290 | Elementary Linear Algebra | 2 |
| PSYC 500 | Intermediate Statistics | 3 |
| | KBOR Core Social and Behavioral Sciences (SGE) | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |
| | KBOR Core Institutionally Designated U.S. Culture (SGE) | 3 |

Year 3: Fall

| Course # | Course Name | SCH=15 |
|----------|-------------|--------|
| PSYC 599 | Data III | 3 |

| | | |
|--|--|---|
| | Domain of Application: Course numbered 300-699 from ABSC, COMS, ECON, MATH, POLS, PSYC, or SOC | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |

Year 3: Spring

| Course # | Course Name | SCH=15 |
|----------|---|--------|
| PSYC 612 | Data IV | 3 |
| | Domain of Application : Course numbered 300-699 from ABSC, COMS, ECON, MATH, POLS, PSYC, or SOC | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |
| | Second Area of Study/Elective/Degree Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |

Year 4: Fall

| Course # | Course Name | SCH=15 |
|----------|---|--------|
| | Domain of Application Course numbered 300-699 from ABSC, COMS, ECON, MATH, POLS, PSYC, or SOC | 6 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |

Year 4: Spring

| Course # | Course Name | SCH=15 |
|----------|--|--------|
| PSYC 699 | Community Data Lab | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |
| | Second Area of Study/Elective/Degree/Junior-Senior Hours | 3 |

Total Number of Semester Credit Hours 120

VIII. Core Faculty

Note: * Next to Faculty Name Denotes Director of the Program, if applicable

FTE: 1.0 FTE = Full-Time Equivalency Devoted to Program

| Faculty Name | Rank | Highest Degree | Tenure Track Y/N | Academic Area of Specialization | FTE to Proposed Program |
|------------------|------------------------------|----------------|------------------|---------------------------------|-------------------------|
| William Duncan | Assistant Research Professor | PhD | N | Economics | 1.0 |
| Michael Branicky | Professor | ScD | Y | Computer Science | 0.5 |
| Jeff Girard | Assistant Professor | PhD | Y | Psychology | 0.5 |
| Donna Ginther | Professor | PhD | Y | Economics | 0.10 |

| | | | | | |
|------------------|---------------------|-----|---|-------------------|------|
| Ben Allen | Assistant Professor | PhD | Y | Psychology | 0.10 |
| Hossein Saiedian | Professor | PhD | Y | Computer Science | 0.10 |
| Clayton Webb | Associate Professor | PhD | Y | Political Science | 0.20 |
| Math, Varies | | | | Mathematics | 0.30 |

Number of graduate assistants assigned to this program 2

IX. Expenditure and Funding Sources

| A. EXPENDITURES | First FY | Second FY | Third FY |
|--|-----------|-----------|-----------|
| Personnel – Reassigned or Existing Positions | | | |
| Faculty | \$59,319 | \$104,977 | \$149,057 |
| Administrators (<i>other than instruction time</i>) | \$18,819 | \$19,195 | \$19,579 |
| Graduate Assistants | \$20,000 | \$20,400 | \$20,808 |
| Support Staff for Administration (<i>e.g., secretarial</i>) | 0 | 0 | 0 |
| Fringe Benefits (<i>total for all groups</i>) | \$26,924 | \$41,694 | \$55,961 |
| Other Personnel Costs | 0 | 0 | 0 |
| Total Existing Personnel Costs – Reassigned or Existing | \$125,062 | \$186,266 | \$245,405 |
| | | | |
| Personnel – New Positions | | | |
| Faculty | 0 | 0 | \$42,500 |
| Administrators (<i>other than instruction time</i>) | 0 | 0 | 0 |
| Graduate Assistants | 0 | 0 | 0 |
| Support Staff for Administration (<i>e.g., secretarial</i>) | 0 | 0 | 0 |
| Fringe Benefits (<i>total for all groups</i>) | 0 | 0 | \$13,600 |
| Other Personnel Costs | 0 | 0 | 0 |
| Total Existing Personnel Costs – New Positions | 0 | 0 | \$56,100 |
| | | | |
| Start-up Costs - One-Time Expenses | | | |
| Library/learning resources | 0 | 0 | 0 |
| Equipment/Technology | 0 | 0 | 0 |
| Physical Facilities: Construction or Renovation | 0 | 0 | 0 |
| Other: Marketing | \$3,000 | 0 | 0 |
| Total Start-up Costs | \$3,000 | \$0 | \$0 |
| | | | |
| Operating Costs – Recurring Expenses | | | |
| Supplies/Expenses | 5,000 | 5,000 | 5,000 |
| Library/learning resources | 2,000 | 2,000 | 2,000 |
| Equipment/Technology | 10,000 | 10,000 | 10,000 |
| Travel | 12,000 | 12,000 | 12,000 |

| | | | |
|------------------------------|------------|-----------|-----------|
| Other | 6,000 | 6,000 | 6,000 |
| Total Operating Costs | \$35,000 | \$35,000 | \$35,000 |
| | | | |
| GRAND TOTAL COSTS | \\$163,062 | \$221,266 | \$336,505 |

| B. FUNDING SOURCES <i>(projected as appropriate)</i> | Current | First FY (New) | Second FY (New) | Third FY (New) |
|---|-----------|-------------------|--------------------|-------------------|
| Tuition / State Funds | 0 | \$90,126 | \$180,252 | \$360,504 |
| Student Fees | 0 | \$1,500 | \$3,000 | \$6,000 |
| Other Sources (grant) | \$496,152 | \$445,119 | \$491,300 | 0 |
| GRAND TOTAL FUNDING | \$496,152 | \$536,745 | \$674,552 | \$366,504 |
| | | | | |
| C. Projected Surplus/Deficit (+/-) (Grand Total Funding <i>minus</i> Grand Total Costs) | | \$373,683 | \$453,286 | \$29,999 |

X. Expenditures and Funding Sources Explanations

A. Expenditures

Personnel – Reassigned or Existing Positions

The personnel that already teach courses at the University of Kansas that will be in the Bachelor of Science in Data Science include faculty who teach in the undergraduate data science certificate as well as faculty teaching math and computer science coursework that will be required of students in the program.

Additionally, there are personnel supported by the National Science Foundation (NSF) Kansas Data Science Consortium (KDSC) grant. These include one faculty member teaching core classes in the data science certificate which will also be in the major, two graduate students, and a project coordinator.

Personnel – New Positions

As enrollments increase, there will be a need for additional faculty. We have applied for a Data Science Center grant from the National Science Foundation that, if successful, would provide funding for an additional faculty member. If it is not successful, we anticipate that we will need university resources to hire a new FTE faculty member in the third year of the major.

As the number of majors increases, we anticipate that this will provide some additional administrative burden on academic advisors and allocate 0.25 FTEs for that work in the third year of the major.

Start-up Costs – One-Time Expenses

One-time start-up costs for marketing can be covered by the KDSC NSF grant.

Operating Costs – Recurring Expenses

The recurring expenses for the program include travel, supplies, library and learning resources, equipment and technology, as well as other costs. Based on expenditures during the first two years of the KDSC grant, we anticipate needing \$5,000 in supplies, \$2,000 for library and learning resources, \$10,000 for equipment and technology, \$12,000 for travel, and \$5,000 for other expenses. The library and learning resources budget support the data science program's efforts to maintain a repository of data science materials on a public-facing platform. The equipment and technology budget supports access to licensed software for faculty and students, which is common to data science coursework. The travel budget supports faculty and students attending an annual data science conference in Kansas to showcase work on community partner sponsored projects.

B. Revenue: Funding Sources

Roughly 61.5% of KU students are in-state and 38.5% are out-of-state students. Tuition revenue was calculated by first allocating SCH into in-state and out-of-state and then using a weighted tuition average of \$600.84 per credit hour. Those SCH numbers were then multiplied by the student credit hour generated each year. Student fees include a \$10 College of Liberal Arts & Sciences student fee.

In the other category of revenue, we account for funding that we have received from the National Science Foundation to support the work of the Kansas Data Science Consortium at the University of Kansas.

We have also applied for an additional award at the National Science Foundation through the Data Science Center solicitation. This proposal was submitted in June 2024 and a decision on the proposal is expected in December 2024. If successful, this award would provide additional resources for the University of Kansas to allocate to the development of the data science major.

C. Projected Surplus/Deficit

There are significant budget surpluses in the first and second year as a result of NSF grant funding (other sources) that is available to help cover expenses for the major. The surplus goes down to roughly \$30,000 in year three when the grant ends, plus additional faculty is needed for the program. The surplus would grow in year 4 as we have additional students to offset the additional faculty support added in year 3.

XI. References

AI Multiple. (n.d.). *Bias in AI: What it is, types, Examples & 6 ways to fix it*. Retrieved December 16, 2024, from <https://research.aimultiple.com/ai-bias/>.

Bureau of Labor Statistics. Industry and occupational employment projections overview and highlights, 2022-32. October 2023. Online. Accessed 9/1/2024.

Lightcast Report. Program Overview; Data Analytics. Lightcast Q4 2022 Data Set. November 2022.