

August 16, 2021


Michael Baumgartner, Ph.D.  
Executive Director  
Coordinating Commission for Postsecondary Education  
PO Box 95005  
Lincoln, NE 68509-5005  
[mike.baumgartner@nebraska.gov](mailto:mike.baumgartner@nebraska.gov)

Dear Dr. Baumgartner:

Enclosed is a copy of the proposal to create the Bachelor of Science in Statistics and Data Analytics in the Department of Statistics in the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln. The proposal was approved by the Board of Regents at the August 13, 2021 meeting. Also enclosed is the Proposal for New Instructional Program Form 92-40.

Please do not hesitate to contact me if you have any questions.

With warmest personal regards,



Jeffrey P. Gold, M.D.  
Executive Vice President and Provost



Enclosures

JPG/cr

cc: Ronnie Green, Ph.D., Chancellor  
Elizabeth Spiller, Ph.D., Executive Vice Chancellor and Chief Academic Officer  
Mike Boehm, Ph.D., Vice Chancellor, Institute of Agriculture and Natural Resources  
Tiffany Heng-Moss, Ph.D., Dean, College of Agricultural Sciences and Natural Resources  
David Jackson, Ph.D., Vice Provost

**COORDINATING COMMISSION  
FOR POSTSECONDARY EDUCATION**

140 N. 8<sup>th</sup> Street, Suite 300  
Lincoln, NE 68508

Telephone: (402) 471-2847  
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**PROPOSAL FOR NEW INSTRUCTIONAL PROGRAM**  
Form 92-40

**SECTION I**

Institution Submitting Proposal: University of Nebraska-Lincoln

Title of Program: Statistics and Data Analytics

CIP Code: 27.0501

Organizational Unit in which program will be located:

Department of Statistics

College of Agricultural Sciences and Natural Resources

Name of contact person in the event additional information is needed: Dr. Jeffrey P. Gold

Telephone: 402-472-5242

Degree, Diploma, or Certificate to be offered (use separate submittal for each level):

Bachelor of Science in Statistics and Data Analytics

Proposed date to initiate program: When approved by the Coordinating Commission

List the location(s) where this program will be offered: UNL

If the program has a projected ending date, please so indicate:

Date approved by Governing Board: August 13, 2021

(Attach all documents related to this proposal upon which the Governing Board made its decision to approve the proposal.)

Chief Executive Officer's or other Authorized Officer's signature: \_\_\_\_\_



Jeffrey P. Gold



TO: The Board of Regents Addendum XI-A-3  
Academic Affairs Committee

MEETING DATE: August 13, 2021

SUBJECT: Creation of a Bachelor of Science in Statistics and Data Analytics in the Department of Statistics in the College of Agricultural Sciences and Natural Resources at the University of Nebraska-Lincoln

RECOMMENDED ACTION: Approval to create a Bachelor of Science (BS) in Statistics and Data Analytics in the Department of Statistics in the College of Agricultural Science and Natural Resources at the University of Nebraska-Lincoln (UNL)

PREVIOUS ACTIONS: March 5, 2005 – The renaming of the major in Mathematics and Statistics to the Major in Mathematics at UNL was reported to the Board.

June 7, 2003 – The Board approved the merger of the Division of Statistics within the Department of Mathematics and Statistics and the Department of Biometry to form the new Department of Statistics. The Department of Mathematics and Statistics was renamed the Department of Mathematics.

June 7, 2003 – The Board approved the consolidation of the Master of Science in Biometry and the statistics specialization of the Master of Science in Mathematics and Statistics into a single Master of Science in Statistics from the Department of Statistics.

June 7, 2003 – The Board approved moving the administrative responsibility for the Statistics PhD from the Department of Mathematics to the new Department of Statistics.

EXPLANATION: The proposed BS degree in Statistics and Data Analytics is designed for students who wish to pursue careers in statistics, machine learning, and data analytics. The State of Nebraska does not have, at any institution, an undergraduate degree dedicated to Statistics and Data Analytics. The proposed curriculum will interweave statistical thinking and computing with writing, data exploration, and data analysis. Students will be able to identify problems that can be informed by data, collect the data, analyze it appropriately, and communicate the results in a readily understandable manner. Upon graduation, students will be qualified for immediate employment at a variety of business and technology companies; they also will be prepared for graduate studies in Statistics, Biostatistics and related fields.

This proposal has been reviewed by the Council of Academic Officers; it also has been reviewed by the Academic Affairs Committee.

PROGRAM COST: \$5,000 in Year 1; \$25,000 over five years

SOURCE OF FUNDS: Tuition and fees

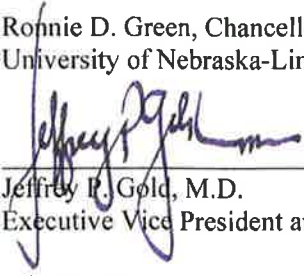
SPONSORS:

Michael J. Boehm  
Vice President, Agriculture and Natural Resources, University of Nebraska  
Harlan Vice Chancellor, Institute of Agriculture and Natural Resources,  
University of Nebraska-Lincoln

Elizabeth Spiller  
Executive Vice Chancellor and Chief Academic Officer

Ronnie D. Green, Chancellor  
University of Nebraska-Lincoln

RECOMMENDED:

  
\_\_\_\_\_  
Jeffrey P. Gold, M.D.  
Executive Vice President and Provost

DATE:

July 16, 2021



April 29, 2021

Susan Fritz, Executive Vice President and Provost  
University of Nebraska  
3835 Holdrege Street  
Lincoln, NE 68583-0745

Dear EVPP Fritz,

I am forwarding materials related to a proposal to create a Bachelor of Science degree in Statistics and Data Analytics to be administered by the Department of Statistics in the College of Agricultural Sciences and Natural Resources.

This program will fill a gap in the university's undergraduate offerings and improve our competitive stance in the Big Ten and the higher education marketplace. The program is designed to meet the needs of students who are pursuing careers in statistics, machine learning, and data analytics to construct novel solutions to society's challenges.

The core courses are already established, there are adequate existing resources, and a sufficient number of quality faculty are available. This proposal has the full endorsement of the Academic Planning Committee and it has my approval. I am requesting you approve it and that it be reported to the Board of Regents at an upcoming meeting.

Sincerely,

Ronnie D. Green, Ph.D.  
Chancellor

- c: Kurt Geisinger, Chair, Academic Planning Committee
- Mike Boehm, Vice Chancellor, IANR
- Tiffany Heng-Moss, Dean, College of Agricultural Sciences and Natural Resources
- Bertrand Clarke, Department Head, Statistics
- Mike Zeleny, Associate to the Chancellor and APC Secretary
- Renee Batman, Assistant Vice Chancellor, Academic Affairs
- Suzi Tamerius, Project Coordinator, Academic Affairs
- Karen Griffin, Coordinator of Faculty Governance, Academic Planning Committee
- David Jackson, Vice Provost
- Cathy Robertus, Executive Assistant to the EVPP

# University of Nebraska-Lincoln

## New Undergraduate Major or Degree

### I. Descriptive Information

|  |
|--|
| <b>Name of Institution Proposing New Major or Degree</b>   |
| University of Nebraska-Lincoln   |
| <b>Name of Proposed Major or Degree</b>  |
| Statistics and Data Analytics  |
| <b>Degree to be Awarded to Graduates of the Major</b>  |
| Bachelor of Science in Statistics and Data Analytics   |
| <b>Other Majors or Degrees Offered in this Field by Institution</b>  |
| The University of Nebraska-Lincoln currently offers no undergraduate degree or major in Statistics and Data Analytics. The Department of Statistics already offers both a Masters and PhD in Statistics. |
| <b>CIP Code</b> [IEA can help with CIP codes or browse here: <a href="http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55">http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55</a> ]                       |
| 27.0501  |
| <b>Subject Code</b>  |
| STAT (existing subject prefix code)  |
| <b>Administrative Units for the Major or Degree</b>  |
| Department of Statistics   |
| <b>Proposed Delivery Site</b>  |
| University of Nebraska-Lincoln   |
| <b>Program will be Offered</b> [full program, not individual courses]  |
| <input checked="" type="checkbox"/> On-campus only <input type="checkbox"/> Distance only <input type="checkbox"/> Both (on-campus and distance)   |
| <b>Date Approved by the Governing Board</b>  |
| Pending  |
| <b>Proposed Date the New Major or Degree will be Initiated</b>   |
| Upon approval by the Coordinating Commission.  |

### II. Details

#### A. Purpose of the Proposed Major or Degree:

Data are ubiquitous and proficiency with data has become essential for both the routine functioning of society and for continued advances in many disciplines. While statistics and data analytics as a field go back to the early 1900s, the growth of the field accelerated in the early 90s, driven by the dramatic decrease in the cost of data collection and advances in computing. This acceleration shows no sign of slowing and UNL, alone in the Big 10, does not have an undergraduate degree in Statistics and Data Analytics. This proposal remedies that omission and positions UNL to be a leader in statistics and data analytics.

The proposed undergraduate degree program in statistics and data analytics is designed to serve the needs of students who wish to pursue careers in statistics, machine learning, and data analytics. The program is designed to produce students who can, working alone or as part of a team, identify a problem which can be informed by data, collect the data, analyze it appropriately, and communicate the results effectively. Upon graduation, students will be qualified for immediate employment at a variety of business and technology companies; they also will be prepared for graduate studies in statistics and related fields. Therefore, this degree program will prepare students for successful careers and create a pipeline for advanced degrees at UNL (Statistics) and UNMC (Biostatistics).

The state of Nebraska does not have, at any institution, an undergraduate degree dedicated to Statistics and Data Analytics. Unlike most existing undergraduate programs around the country, the program proposed here is an innovative synthesis of data analysis, statistical thinking, statistical computing, and technical communication skills. The core courses interweave statistical thinking and computing with writing and data exploration and analysis from the start, requiring students to present technical information in a readily understandable manner using visualizations, verbal discussion, and written reports.

#### **B. Description of the Proposed Major or Degree:**

Students in statistics learn how to use data to solve problems in a complex world. The degree program offers students the opportunity to formulate an answerable question, develop methodology for data analysis, collect data appropriately, extract evidence from that data, and use statistical reasoning to transform that evidence into information that can be used by enterprises, government, and other stakeholders. Graduates will be able to adapt to an ever-evolving data landscape and use their knowledge to construct novel solutions to challenges that are meaningful for society.

#### **Learning Outcomes**

Graduates of statistics and data analytics will be able to:

1. Identify the question to be answered, and design an appropriate data collection strategy.
2. Appropriately analyze data to solve complex problems.
3. Understand the underlying assumptions and theoretical properties of the analysis.
4. Use appropriate computing applications to pre-process, organize, visualize, and analyze data.
5. Demonstrate an understanding of how statistical procedures are computationally implemented, including awareness of when a procedure has failed and what to do about it.
6. Communicate statistical concepts and interpretation of data and results with collaborators in conversation, and through visual summaries and written reports.

Requirements for admission into the degree program and College of Agricultural Sciences and Natural Resources (CASNR) are consistent with general University admission requirements (one unit equals one high school year): 4 units of English, 4 units of mathematics, 3 units of natural sciences, 3 units of social studies, and 2 units of foreign language. Students must also meet performance requirements [ACT composite of 20 or higher OR combined SAT score of 1030 or higher OR a GPA of 3.0 or higher (on a 4.0 scale); transfer students must have a 2.0 (on a 4.0 scale) cumulative grade point average and 2.0 on the most recent term of attendance].

#### **Core degree requirements (including CASNR requirements):**

#### **Removal of C-, D, and F Grades**

Only the most recent letter grade received in a given course will be used in computing a student's cumulative grade point average if the student has completed the course more than once and previously received a grade or grades below C in that course.

The previous grade (or grades) will not be used in the computation of the cumulative grade point average, but it will remain a part of the academic record and will appear on any transcript.

A student can remove from his/her cumulative grade point average a course grade of C-, D+, D, D-, or F if the student repeats the same course at the University of Nebraska and receives a grade other than P (pass), I (incomplete), N (no pass), W (withdrew), or NR (no report). If a course is no longer being offered, it is not eligible for the revised grade point average computation process.

For complete procedures and regulations, see the Office of the University Registrar website at <https://registrar.unl.edu/academic-standards/course-repeats/>

### **Pass/No Pass**

Students in CASNR may take any course offered on a Pass/No Pass basis within the 24-hour limitation established by the Faculty Senate.

### **GPA Requirements**

A minimum cumulative grade point average of C (2.0 on a 4.0 scale) must be maintained throughout the course of studies and is required for graduation.

### **Transfer Credit Rules**

To be considered for admission, a transfer student, Nebraska resident or nonresident, must have an accumulated average of C (2.0 on a 4.0 scale) and a minimum C average in the last semester of attendance at another college. Transfer students who have completed less than 12 credit hours of college study must submit either ACT or SAT scores.

Ordinarily, credits earned at an accredited college are accepted by the University. The College, however, will evaluate all hours submitted on an application for transfer and reserves the right to accept or reject any of them. Sixty (60) is the maximum number of hours the University will accept on transfer from a two-year college. Ninety (90) is the maximum number of hours the University will accept from a four-year college. Transfer credit in the degree program must be approved by the degree program advisor on a Request for Substitution Form to meet specific course requirements, group requirements, or course level requirements in the degree. At least nine hours in the major field, including the capstone course, must be completed at the University of Nebraska-Lincoln regardless of the number of hours transferred.

The College will accept no more than 10 semester hours of C-, D+, D, and D- grades from other schools. The C-, D+, D, and D- grades can only be applied to free electives. This policy does not apply to the transfer of grades from University of Nebraska at Omaha or University of Nebraska-Kearney to the University of Nebraska-Lincoln.

### **Course Requirements**

The course requirements and student learning outcomes for a Bachelor of Science in Statistics and Data Analytics and degree program requirements are detailed in Appendix B. These courses have already been developed and approved by the college and campus curriculum committees.

#### **Core Course Descriptions:**

##### **STAT 100** Career Explorations in Statistics – Credit Hours: 1

Introduction to the field of statistics, and exploration of careers available to those trained in statistics.

##### **STAT 101** Introduction to Data – Credit Hours: 3

An introduction to statistics through exploratory data analysis and data visualization. Topics include data types, chart types, methods for working with and reducing data, simple regression, regression diagnostics. Focuses on how to communicate statistical information and how to critically consume statistical information presented in the media and popular press.



**STAT 102 Principles of Statistical Analysis – Credit Hours: 3**

Introduction to formal statistical inference and elementary probability for statistics majors. Explores the practical application of statistical techniques to meaningful scientific problems. Inference topics will be implemented using both simulation-based approaches and classical, theory-based methods.

**STAT 151 Introduction to Statistical Computing – Credit Hours: 1**

Introduction to programming for statistical analysis. Covers basic programming concepts necessary for statistics, good computing practice, and use of built-in functions to complete basic statistical analyses.

**STAT 212 Principles of Study Design – Credit Hours: 4**

Introduction to statistical aspects of study design. Both designed experiments and observational studies are covered. Sampling techniques, major experimental and treatment design structures, as well as power and sample size considerations.

**STAT 251 Statistical Computing I: Data Wrangling – Credit Hours: 3**

Techniques for processing, cleaning, and visualizing messy data. Topics include data reduction strategies, data transformations, combining multiple data sources, and special types of data (text, spatial, dates and times, hierarchical).

**STAT 262 Probability for Statisticians – Credit Hours: 3**

Probabilistic undergirding of statistical procedures including moments, common parametric families, marginal and conditional densities, sufficient statistics, modes of convergence, laws of large numbers and the central limit theorem and how they apply to estimators.

**STAT 301 Mathematical Statistics and Modeling I – Credit Hours: 3**

Essential statistical theory and methods for professional statistical practice. Broad statistical topics include estimation and hypothesis testing, elementary Bayesian concepts, multiple linear regression, linear mixed effects models, analysis of variance (ANOVA), logistic regression, Poisson regression, and nonparametric methods.

**STAT 302 Mathematical Statistics and Modeling II – Credit Hours: 3**

Essential statistical theory and methods for professional statistical practice. Topics include data transformation, multiple sources of error, elementary model selection, generalized linear mixed models, Bayesian models, and other theory and methods deemed appropriate as statistical science continues to evolve.

**STAT 325 Statistical Collaboration I – Credit Hours: 3**

Introduction to the role and purpose of statistical consulting and interdisciplinary collaboration. Covers processes for successful interdisciplinary collaboration, including asking good questions, dealing with difficult clients, communicating statistics to non-statisticians, working in teams, and determining solutions to answer the client's research question.

**STAT 349 Technical Skills for Statisticians – Credit Hours: 3**

Creation of research reports, business reports, and executive summaries. Presentation strategies, consequences of statistical modeling for real-world decision making, and countering common misconceptions and errors in statistical reasoning. Focus on real-world applications in research, business, and public service.

**STAT 351 Statistical Computing II: Data Management and Visualization – Credit Hours: 3**

Computational skills for management, visualization and analysis of large and complex data which are necessary for modern statistics. Includes a wide range of topics necessary for data analytics, including harvesting data from websites and common data structures, setting up and working with databases, and designing interactive data displays.

**STAT 464 Model Selection and Prediction – Credit Hours: 3**

Methods for selecting models applicable to real-world problems. Prediction as a modeling goal, models for prediction as opposed to inference. Methods for emerging data types, such streaming data, social network data, censored data, and others.

A brief overview of major requirements is shown below.

**Table 1. Core degree requirements (including CASNR requirements) 96 credits**

| Topic area                            | Required Credits | ACE   |
|---------------------------------------|------------------|-------|
| College integrative course (SCIL 101) | 3                | 8     |
| Mathematics (MATH 106, 107, 208, 314) | 16               | 3     |
| Economics                             | 3                | 6     |
| Communications                        | 6                | 1,2   |
| Biology, Chemistry, Physics           | 8                | 4     |
| Major Requirements                    | 36               |       |
| STAT Electives                        | 12               |       |
| Capstone Course                       | 3                | 10    |
| ACE Courses                           | 9                | 5,7,9 |

For statistics electives, students will select at least 4 courses with a STAT prefix at the 300- or 400- level, excluding STAT 318, STAT 380, STAT 430, STAT 462, and STAT 463. They will select a capstone course from among STAT 425 (Statistical Collaboration II), STAT 451 (Development of Statistical Software), STAT 471 (Analysis of Messy Data), and STAT 499 (Undergraduate Thesis).

**Example Four-Year Plan**

| <b>Freshman Year</b>                 |           |  |  |           |
|--------------------------------------|-----------|--|--|-----------|
| <b>Term 1</b>                        | <b>cr</b> |  | <b>Term 2</b>  | <b>cr</b> |
| SCIL 101 Science Literacy (ACE 8)    | 3         |  | MATH 107 Calculus II                                 | 4         |
| MATH 106 Calculus I (ACE 3)          | 5         |  | LIFE 120/120L Fundamentals of Biology & Lab (ACE 4)  | 4         |
| ENGL 150 Writing and Inquiry (ACE 1) | 3         |  | ALEC 102 Interpersonal Skills for Leadership (ACE 2) | 3         |
| STAT 100 Career Explorations in Stat | 1         |  | STAT 102 Principles of Statistical Analysis          | 3         |
| STAT 101 Introduction to Data        | 3         |  | STAT 151 Intro to Stat Computing                     | 1         |
| <b>Total credit hours</b>            | <b>15</b> |  | <b>Total credit hours</b>                            | <b>15</b> |

| <b>Sophomore Year</b>                            |           |  |                                  |           |
|--|-----------|--|----------------------------------|-----------|
| <b>Term 3</b>                                    | <b>cr</b> |  | <b>Term 4</b>                    | <b>cr</b> |
| MATH 208 Calculus III                            | 4         |  | MATH 314 Linear Algebra          | 3         |
| CHEM 105 Chemistry in Context I                  | 4         |  | ACE 5 Humanities                 | 3         |
| AECN 141 Introduction to Economics of Ag (ACE 6) | 3         |  | ACE 7 Arts                       | 3         |
| STAT 212 Principles of Study Design              | 4         |  | STAT 251 Statistical Computing I | 3         |
|  |           |  | STAT 262 Probability             | 3         |
| <b>Total credit hours</b>                        | <b>15</b> |  | <b>Total credit hours</b>        | <b>15</b> |

| <b>Junior Year</b>                 |           |  |   |           |
|------------------------------------|-----------|--|---|-----------|
| <b>Term 5</b>                      | <b>cr</b> |  | <b>Term 6</b>                               | <b>cr</b> |
| ACE 9 Global Awareness             | 3         |  | STAT 302 Math Stat & Modeling II            | 3         |
| STAT 301 Math Stat & Modeling I    | 3         |  | STAT 349 Technical Skills for Statisticians | 3         |
| STAT 325 Statistical Collaboration | 3         |  | STAT Elective                               | 3         |
| STAT Elective                      | 3         |  | STAT Elective                               | 3         |
| Focused/Free Elective              | 3         |  | Focused/Free Elective                       | 3         |
| <b>Total credit hours</b>          | <b>15</b> |  | <b>Total credit hours</b>                   | <b>15</b> |

| <b>Senior Year</b>                    |           |  |  |           |
|---------------------------------------|-----------|--|--|-----------|
| <b>Term 7</b>                         | <b>cr</b> |  | <b>Term 8</b>  | <b>cr</b> |
| STAT 464 Model Selection & Prediction | 3         |  | ACE 10 Capstone (Choose from STAT 425, STAT 471, STAT 451, STAT 499) | 3         |
| STAT 351 Statistical Computing II     | 3         |  | Focused/Free Electives   | 12        |
| STAT Elective                         | 3         |  |  |           |
| Focused/Free Electives                | 6         |  |  |           |
|                                       |           |  |  |           |
| <b>Total credit hours</b>             | <b>15</b> |  | <b>Total credit hours</b>  | <b>15</b> |

**Four Year Credit Hour Total = 120**

## **Advising and Internships**

Students will be advised by both a faculty member and a professional advisor. The faculty member will work to mentor students on career and academic success, and the professional advisor will assist students with scheduling coursework and completing their degree in a timely fashion. The professional advisor will also work with students undergoing Academic Recovery. Although not a requirement of the degree program, students will be strongly encouraged to participate in internships. The faculty members and the professional advisor will work with students to help the students secure internships.

## **III. Review Criteria**

### **A. Centrality to UNL Role and Mission**

As a land-grant University, the University of Nebraska–Lincoln is charged with instruction, research, and outreach in agriculture and mechanic arts, not excluding other scientific or classical areas of study. The Institute of Agriculture and Natural Resources (IANR) was established through Nebraska legislative action for leadership in and service in agriculture, natural resources, and related fields of study. The College of Agriculture Sciences and Natural Resources (CASNR) is home to over 25 undergraduate degree programs providing instruction, research, and outreach in agriculture, natural sciences, and other related fields. Within CASNR, the Department of Statistics offers graduate programs at the MS and PhD levels.

Both CASNR and Statistics have a long and distinguished history of preparing talented, highly-trained, and motivated professionals who develop solutions, innovations, and discoveries changing the future of the world. A new degree program in Statistics and Data Analytics would continue the tradition of preparing students for rewarding careers in the multi-disciplinary fields of statistics and data analytics.

### **B. Relationship to NU 5-Year Strategic Priorities**

The Statistics and Data Analytics major will meet the NU's 5-year strategic priorities. The new degree program will contribute to the strategic priorities in three critical ways. First, Statistics and Data Analytics major will increase the quality of the undergraduate learning pathway by engaging our students in systems thinking and increasing their confidence in data-based decision making. Second, the program will contribute to building a talented, competitive workforce and knowledge-based economy in Nebraska in partnership with the state, private sector and other educational institutions. Finally, graduates of this program will be able to engage with the citizens of Nebraska to help solve data-driven challenges to ensure the economic growth and vitality of Nebraska communities.

### **C. Evidence of Need and Demand**

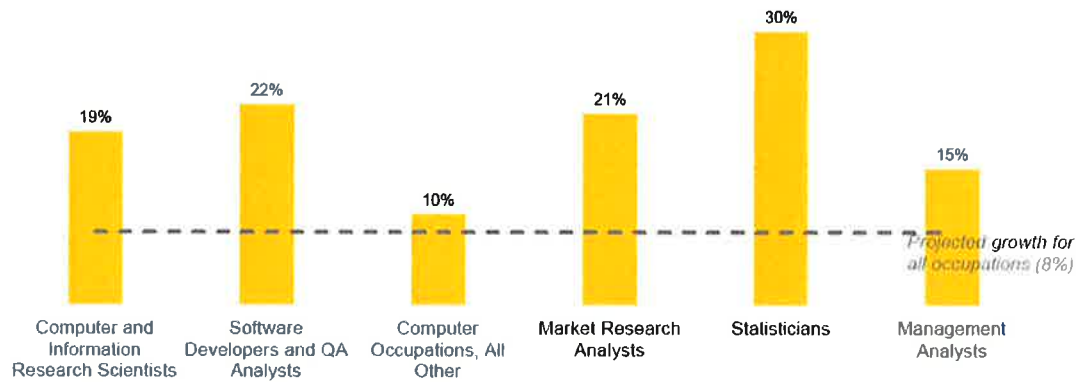
1. **Need:** Each day, people generate an increasing amount of data, as we add smart devices to our homes, new sensors to gather data from our power grids and highways, and advance scientific inquiry through data collection and analysis. As a result, statistics and data analytics are among the most in-demand skill sets in business settings, with a predicted increase in jobs of 30% between 2019-2029 (Appendix E, ADV Market Research & Consulting, Slide 5). Moreover, 69% of businesses report preferentially hiring those with analytics skills, such as statistics and data analytics, across a wide variety of positions<sup>1</sup>.

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<sup>1</sup> [https://www.bhef.com/sites/default/files/bhef\\_2017\\_investing\\_in\\_dsa.pdf](https://www.bhef.com/sites/default/files/bhef_2017_investing_in_dsa.pdf)

# Data science occupations projected to grow in the 2020s, especially statisticians

Projected Growth in Employment for Top Occupations for Data Scientists, 2019-2029



According to the Bureau of Labor Statistics, ‘Statistician’ is one of the fastest growing occupations in the US<sup>2</sup>, and this is true in Nebraska as well. Overall, the number of jobs in Nebraska is expected to grow by 5.52% by 2028. However, over this timeframe, the job market for Statisticians in Nebraska is expected to increase more than 25%, with 72 ‘Statistician’ jobs added<sup>3</sup>. This does not include jobs added in related fields such as operations research and software application development, where similar increases are projected. Statistics and related fields (software development, operations research, etc.) account for 5 of the top 12 occupations with the highest expected job growth in Nebraska over the next 7 years, with 2214 jobs added across Statistics and related areas. NEworks estimates that for each 3 statistics positions posted, there are only 2 candidates.

An IBM report<sup>4</sup> indicates that the demand for data and statistics skills is spread across industries such as finance, insurance, professional services, and IT. Applications for statistics in agricultural industries are increasing as well: farmers can now gather data on crop growth using drones, monitoring for nutrient deficiencies and pests; Fitbit-like devices are sold to monitor livestock health, location, and activity levels. All of these data-generating devices provide no utility without analysts who turn the streams of data into actionable, useful information. In a survey of data analytics and statistics postings on Glassdoor for the state of Nebraska, companies such as 3M, Humana, Thermo Fisher Scientific, ConAgra, and Sandhills Global are currently looking for statisticians and data analysts. Other companies attempt to develop data analytics skill sets in-house, because of the perception that data professionals gravitate towards the coasts and urban areas. Developing a local source of statistical talent will provide Nebraska companies with the opportunity to recruit Nebraska graduates.

2. Demand: Between 2010 and 2018, the number of statistics degrees issued in the United States increased almost five-fold<sup>5</sup>. The number of bachelor’s degrees in statistics awarded in 2019 was 3,745, which represents a 92% increase since 2015 (Appendix E, ADV Market Research & Consulting, Slide 4).

<sup>2</sup> <https://www.bls.gov/emp/tables/fastest-growing-occupations.htm>

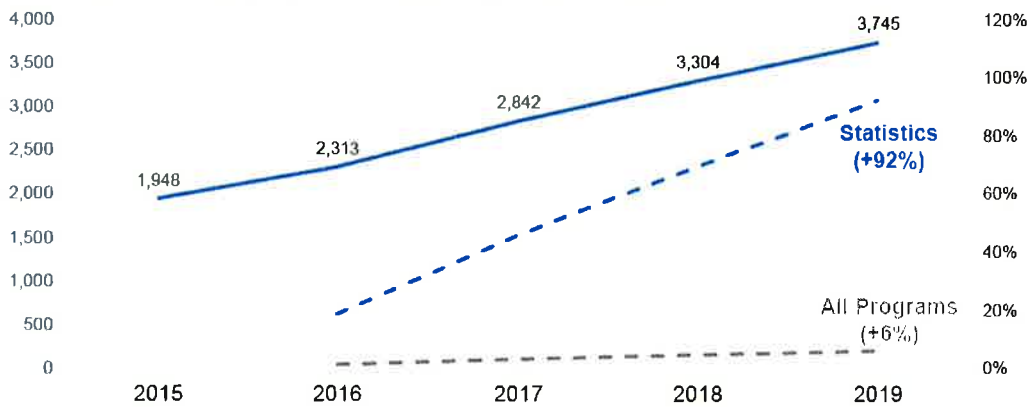
<sup>3</sup> <https://neworks.nebraska.gov/gsipub/index.asp?docid=440>

<sup>4</sup> <https://www.ibm.com/downloads/cas/3RL3VXGA>

<sup>5</sup> <https://www2.amstat.org/misc/StatBiostatTable1987-Current.pdf>

# Rapid growth in statistics programs

**Bachelor's Degrees Awarded in Statistics – Nationally, All Institutions**  
Actual Number and Cumulative % Growth in Degrees Since 2015



While surveys of the population of potential or current students are unlikely to be productive in the current environment, we can look to the success of programs at similar midwestern universities. Iowa State is a comparable land-grant institution in a similar state for which undergraduate enrollment data by major is available. The statistics major in Iowa State consistently has enrollment of 75 and above since 2015. This growth is not unique to Iowa State. The Conference Board of Mathematical Sciences (CBMS) surveys mathematical sciences departments every five years, and found that in 2014-15 the estimated number of bachelor's degrees awarded by statistics departments was 1,847, compared with 838 bachelor's degrees awarded in 2009-10<sup>6</sup>. The CBMS survey will be conducted again in 2021, and is expected to show further growth in degrees awarded by statistics departments. Indeed, the overall number of bachelor's degrees more than doubled between 2014 and 2018<sup>7</sup>.

UNL graduates, resident or non-resident, are likely to stay in Nebraska after completing their degree. Therefore, we expect an undergraduate degree in Statistics and Data Analytics at UNL will not only attract students to the university, but will also increase the number of statistics professionals in the state. Moreover, the program will serve as a pipeline to established graduate programs in Statistics at UNL and Biostatistics at UNMC.

## D. Adequacy of Resources:

The Institute of Agriculture and Natural Resources began investing in this growing area five years ago to support our tripartite mission of research, teaching and extension. The proposed program will use existing faculty, advising, student support, classroom and lab space within the Department of Statistics and the College of Agricultural Sciences and Natural Resources. Future instructional needs to support program growth will be supported through enrollment growth revenue within the University's new IBB model.

Adequate library resources to support the program currently exist at the University of Nebraska-Lincoln. Existing instructional equipment and informational resources exist within the College of Agricultural Sciences and Natural Resources for the proposed program.

<sup>6</sup> [http://www.ams.org/profession/data/cbms-survey/cbms2015\\_Chapter3.pdf](http://www.ams.org/profession/data/cbms-survey/cbms2015_Chapter3.pdf)

<sup>7</sup> <https://ww2.amstat.org/misc/StatTable1987-Current.pdf>



General operating expenses for the new program are estimated to be \$25,000 over five years (\$5,000 each year). This will be funded through reallocation of existing resources within the department.

**Projected Expenses:**

|                          | AY 2022-23 | AY 2023-24 | AY 2024-25 | AY 2025-26 | AY 2026-27 | Total           |
|--------------------------|------------|------------|------------|------------|------------|-----------------|
| <b>General Operating</b> | \$5000     | \$5000     | \$5000     | \$5000     | \$5000     | <b>\$25,000</b> |

Revenue projections are based on conservative student enrollment in the new program for a total of 75 new students by year five. Projected revenue is using the Fall 2019 proportion of resident vs. non-resident undergraduate students in CASNR (72.7% resident and 27.3% non-resident), and the 2020-21 tuition rates of \$259/credit hour for resident students and \$830/credit hour for non-resident students assuming 30 credits per year.

**Projected Enrollment:**

|                     | 2022-23 | 2023-24 | 2024-25 | 2025-26 | 2026-27 |
|---------------------|---------|---------|---------|---------|---------|
| <b>New Students</b> | 5       | 10      | 20      | 20      | 20      |
| <b>Total</b>        | 5       | 15      | 35      | 55      | 70      |

**Revenue Projections:**

|                         | AY 2022-23 | AY 2023-24 | AY 2024-25 | AY 2025-26 | AY 2026-27 | Total              |
|-------------------------|------------|------------|------------|------------|------------|--------------------|
| <b>Tuition and Fees</b> | \$55,980   | \$185,070  | \$443,250  | \$684,300  | \$869,370  | <b>\$2,237,970</b> |

**E. Avoidance of Unnecessary Duplication**

At this time, there are no undergraduate degrees in statistics and data analytics in Nebraska. The four related programs at NU institutions are tangential. At UNL, there is a Mathematics major with a Statistics and Data Science option offered by the Department of Mathematics, which requires three statistics courses (all offered by the Department of Statistics). There is also a UNL minor in Informatics, which requires one statistics course. At UNO, there is a Mathematics major with a Data Science concentration (two statistics courses required) or a Statistics concentration (three statistics courses required). At UNK there is a Data Analytics minor available, which requires one statistics course. Outside of the NU System, Creighton University offers a Data Science track in their Mathematics major (tuition \$42,618 per year), Doane University offers a Data Analytics minor (tuition \$37,080 per year), and Chadron State College offers a minor in Applied Statistics (four statistics courses required). None of these programs can provide the thorough and contemporary training in statistics and data analytics that a dedicated degree program can.

As a separate point, the American Statistical Association has published Curriculum Guidelines for Undergraduate Programs in Statistical Science<sup>8</sup>. These guidelines ensure that graduates are prepared for employment. We have constructed our program to align with these guidelines. The existing programs do not require adequate statistical coursework to ensure graduates would be successful candidates for statistical positions.

In addition, the proposed program is unique among peer institutions for its focus on the integration of statistical skills, communication and collaboration skills, and statistical computing skills. This distinguishes it from similar programs at other midwestern universities, which provide students with courses on statistics and programming, but do not integrate these with the “soft skills” essential for success in the workplace. In addition, while several universities in Nebraska offer master’s programs and graduate certificates in statistics and data analytics, students who wish to obtain a bachelor’s degree in statistics must go out of state. While data analytics programs are relatively common across the country, they still are not able to meet the expected demand for graduates with data analytics skills.

<sup>8</sup> <https://www.amstat.org/asa/education/Curriculum-Guidelines-for-Undergraduate-Programs-in-Statistical-Science.aspx>

Finally, the Department of Statistics at UNL is the only unit in Nebraska that can provide a full complement of PhD level Statistics faculty for undergraduate education. This allows the Department to incorporate recent advances in the field into the undergraduate program rapidly, thereby permitting research experiences for undergraduates. The combination of thoughtfully chosen required statistics courses, complementary communication and computing skills, and PhD faculty with active research programs, will allow us to attract students that the existing programs cannot.

#### **F. Consistency with the Comprehensive Statewide Plan for Post-Secondary Education**

The Statistics and Data Analytics degree addresses the following statewide education goals:

“Nebraska colleges and universities will provide their graduates with the skills and knowledge needed to succeed as capable employees and responsible citizens.”

“Higher education in Nebraska will be responsive to the workforce development and ongoing training needs of employers and industries to sustain a knowledgeable, trained, and skilled workforce in both rural and urban areas of the State.”

“Higher education will serve the State by preparing individuals for productive, fulfilling lives and by developing and nurturing the citizens and future leaders of Nebraska.”

“Postsecondary education institutions will assess evolving needs and priorities in a timely manner and will be prepared to change and adopt new methods and technologies to address the evolving needs and priorities of the students and people of Nebraska.”

“Nebraska’s postsecondary institutions will be student-centered and will offer life-long learning opportunities that are responsive to student’s needs.”

“Postsecondary education institutions will provide appropriate support services to help all students reach their educational goals, regardless of where or how the instruction is delivered.”

The proposed degree would help reduce Nebraska and nationwide workforce shortages by educating and training a new generation of students to address the demand for data analytics and statistics skills across industries such as agriculture, medicine, finance, insurance, professional services, and IT.

## **IV. Appendices**

- A. Letters of Support (attached)
- B. Catalog Copy (available upon request)
- C. Detailed Statistics and Data Analytics degree requirements (available upon request)
- D. Student Learning Outcomes & Associated Courses (available upon request)
- E. ADV Marketing Research & Consulting Report (available upon request)



**Appendix A: Letters of Support**

- UNL College of Arts and Sciences
- UNL College of Engineering
- UNL Department of Mathematics
- UNL Department of Computer Science and Engineering
- American Statistical Association
- Celerion
- Google
- North Carolina State University
- Penn State University

**From:** [Renee Batman](#)  
**To:** [Suzi Tamerius](#)  
**Subject:** FW: Statistics and Data Analytics - Support  
**Date:** Monday, March 1, 2021 8:03:29 AM

---

**From:** Mark Button <[mbutton2@unl.edu](mailto:mbutton2@unl.edu)>  
**Sent:** Sunday, February 28, 2021 2:02 PM  
**To:** Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>; Lance Perez <[lcpez@unl.edu](mailto:lcpez@unl.edu)>  
**Cc:** Renee Batman <[rbatman2@unl.edu](mailto:rbatman2@unl.edu)>; Bertrand Clarke <[bclarke3@unl.edu](mailto:bclarke3@unl.edu)>; Erin Blankenship <[erin.blankenship@unl.edu](mailto:erin.blankenship@unl.edu)>  
**Subject:** RE: Statistics and Data Analytics - Support

Dear Tiffany:

I support the Department of Statistic's proposal to create a Bachelor of Science in Statistics and Data Analytics.

Best wishes,  
Mark

**From:** Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>  
**Sent:** Sunday, February 28, 2021 1:51 PM  
**To:** Mark Button <[mbutton2@unl.edu](mailto:mbutton2@unl.edu)>; Lance Perez <[lcpez@unl.edu](mailto:lcpez@unl.edu)>  
**Cc:** Renee Batman <[rbatman2@unl.edu](mailto:rbatman2@unl.edu)>; Bertrand Clarke <[bclarke3@unl.edu](mailto:bclarke3@unl.edu)>; Erin Blankenship <[erin.blankenship@unl.edu](mailto:erin.blankenship@unl.edu)>; Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>  
**Subject:** Statistics and Data Analytics - Support

Lance and Mark: Could you please respond to this email correspondence indicating your support for the Department of Statistic's proposal to create a Bachelor of Science in Statistics and Data Analytics? Thanks -Tiffany

Tiffany Heng-Moss, Ph.D.  
Dean  
College of Agricultural Sciences and Natural Resources

University of Nebraska  
103 Agricultural Hall  
Lincoln, NE 68583  
402.472.2201  
[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)  
Pronouns: she/her/hers

**#ThisIsCASNR**

**WE ARE A COLLEGE COMMUNITY WHERE EVERYONE  
CHALLENGES THEMSELVES, IS INCLUSIVE, ASKS BOLD  
QUESTIONS, AND IS OPTIMISTIC ABOUT THE FUTURE!**

"If your actions inspire others to dream more, learn more, do more and become more, you are a leader." John Quincy Adams

**From:** [Renee Batman](#)  
**To:** [Suzl Tamerius](#)  
**Subject:** FW: Statistics and Data Analytics - Support  
**Date:** Wednesday, March 3, 2021 11:09:58 AM  
**Attachments:** [image003.png](#)

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**From:** Lance Perez <[lcperetz@unl.edu](mailto:lcperetz@unl.edu)>  
**Sent:** Wednesday, March 3, 2021 11:08 AM  
**To:** Mark Button <[mbutton2@unl.edu](mailto:mbutton2@unl.edu)>; Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>  
**Cc:** Renee Batman <[rbatman2@unl.edu](mailto:rbatman2@unl.edu)>; Bertrand Clarke <[bclarke3@unl.edu](mailto:bclarke3@unl.edu)>; Erin Blankenship <[erin.blankenship@unl.edu](mailto:erin.blankenship@unl.edu)>  
**Subject:** Re: Statistics and Data Analytics - Support

Tiffany:

I am supportive of this proposal.

Lance



**Lance C. Pérez, Ph.D.**  
*Dean*  
*Omar H. Heins Professor of Electrical and Computer Engineering*

College of Engineering, University of Nebraska–Lincoln  
114 Othmer Hall, P.O. Box 880642, Lincoln, NE 68588-0642  
100 Peter Kiewit Institute, 1100 South 67th Street, Omaha, NE 68182-0176  
402-472-5259 / 402-554-6009 / [lcperetz@unl.edu](mailto:lcperetz@unl.edu)  
[engineering.unl.edu](http://engineering.unl.edu) | [twitter.com/UNL\\_LancePerez](https://twitter.com/UNL_LancePerez)  
COMMUNITY | IMPACT | INCLUSION

---

**From:** Mark Button <[mbutton2@unl.edu](mailto:mbutton2@unl.edu)>  
**Date:** Sunday, February 28, 2021 at 2:01 PM  
**To:** Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>, Lance Perez <[lcperetz@unl.edu](mailto:lcperetz@unl.edu)>  
**Cc:** Renee Batman <[rbatman2@unl.edu](mailto:rbatman2@unl.edu)>, Bertrand Clarke <[bclarke3@unl.edu](mailto:bclarke3@unl.edu)>, Erin Blankenship <[erin.blankenship@unl.edu](mailto:erin.blankenship@unl.edu)>  
**Subject:** RE: Statistics and Data Analytics - Support

Dear Tiffany:

I support the Department of Statistic's proposal to create a Bachelor of Science in Statistics and Data Analytics.

Best wishes,  
Mark

**From:** Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>  
**Sent:** Sunday, February 28, 2021 1:51 PM  
**To:** Mark Button <[mbutton2@unl.edu](mailto:mbutton2@unl.edu)>; Lance Perez <[lcperetz@unl.edu](mailto:lcperetz@unl.edu)>  
**Cc:** Renee Batman <[rbatman2@unl.edu](mailto:rbatman2@unl.edu)>; Bertrand Clarke <[bclarke3@unl.edu](mailto:bclarke3@unl.edu)>; Erin Blankenship <[erin.blankenship@unl.edu](mailto:erin.blankenship@unl.edu)>; Tiffany Heng-Moss <[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)>  
**Subject:** Statistics and Data Analytics - Support

Lance and Mark: Could you please respond to this email correspondence indicating your support for the Department of Statistic's proposal to create a Bachelor of Science in Statistics and Data Analytics? Thanks -Tiffany

Tiffany Heng-Moss, Ph.D.  
Dean  
College of Agricultural Sciences and Natural Resources

University of Nebraska  
103 Agricultural Hall  
Lincoln, NE 68583  
402-472-2201  
[thengmoss2@unl.edu](mailto:thengmoss2@unl.edu)  
Pronouns: she/her/hers

April 23, 2020

Professor Bert Clarke  
Chair, Department of Statistics  
University of Nebraska- Lincoln

Dear Bert:

I've looked over your proposal for the new major in statistics. It looks like a very strong and well-designed program. In particular, I fully support the inclusion of the four mathematics courses (Math 106, 107, 208 and 314) in the core degree requirements.

Please let me know if you need any additional documentation regarding this. I look forward to seeing your degree program come to fruition.

Sincerely,



Tom Marley  
Chair, Department of Mathematics  
University of Nebraska-Lincoln

May 29, 2020

Prof. Bertrand Clarke  
Department of Statistics

Dear Prof. Clarke,

I am writing to confirm the support of the Department of Computer Science and Engineering for your department's proposed Bachelor of Science program. Our discussions have identified several possible courses, both introductory and advanced, that may be of interest to students in your new program. We are happy to accommodate your students in the set of courses that make the most sense for your program and your students. We wish you success and look forward to working with you in the future.



Marilyn Wolf  
Koch Professor of Engineering and Chair



February 3, 2021

Bertrand Clarke  
Professor and Chair  
Department of Statistics  
University of Nebraska-Lincoln  
340 Hardin Hall North Wing  
Lincoln, NE 68583-0963

Dear Prof. Clarke,

Thank you for consulting me about your proposed new undergraduate major in Statistics and Data Analytics. As Executive Director of the American Statistical Association (ASA) I have had occasion to observe and review many undergraduate and graduate programs in statistics and data science. And in my previous role as a provost (at Washburn University, just a few hours from you in Kansas) I reviewed programs on campus and elsewhere in my role as an evaluator for the Higher Learning Commission.

Graduates from majors programs such as you propose are in high demand currently and the demand is expected to continue growing for at least 5-10 years. The webpage <https://www.bls.gov/ooh/math/mathematicians-and-statisticians.htm> provides some particulars. A web search will turn up many similar assessments. Research the ASA has done looking into degree data from IPEDS confirms that this is a fast-growing area.

The specific proposal you have sent me is distinct in that it focuses on exploratory data analysis as a starting point for studying statistics and dwells heavily on the way statisticians and non-statisticians collaborate to mutual benefit. Having courses that continually combine theory and methods, computing, and applications rather than compartmentalizing these topics is also novel and well-matched to the emerging world of statistics and data analytics in which boundaries among quantitative people and those who need quantitative support are being eroded. The emphasis on messy data, prediction, and computing is also welcome as statisticians are confronted by more and more demanding problems earlier in their careers.

This program will prepare students for jobs in statistics and data analytics, or to go on to get graduate education in these fields. This is important for public universities, because these are good-paying technical jobs, so the university can show that it is providing direct benefit to the economy of Nebraska.

In short, I think you have a really modern program and that graduates from your program will be highly desired on the job market and for graduate study.

I strongly and without reservation support your efforts and your proposal.

Sincerely,

A handwritten signature in black ink, appearing to read "Ron Wasserstein". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Ronald L. Wasserstein, Executive Director



May 6, 2020

Dr. Bertrand Clarke  
Chair, Department of Statistics  
340 Hardin Hall North  
University of Nebraska  
Lincoln, NE 68583-0963

Dear Dr. Clarke:

Celerion is a global leader in early clinical research services. As a Contract Research Organization, we assist pharmaceutical companies develop their drugs by offering a unique combination of medical expertise, clinical operations experience, and scientific expertise in drug development. One type of scientific expertise Celerion offers our clients is in the area of Biostatistics and SAS Programming. Celerion's team of Biostatisticians and SAS Programmers design, plan and conduct the statistical analyses of data from clinical trials in early clinical research.

Celerion is a global company, but our Global Headquarters are based in Lincoln, Nebraska. As our largest site, it is important to our company strategy to hire statistics and SAS programming talent to be located here in Lincoln, Nebraska. We have been very fortunate to be able to hire high quality, professional, and well-trained Statisticians and SAS programmers with advanced degrees from the University of Nebraska-Lincoln.

The need for more statisticians and data scientists at all levels is very evident in our industry. The competition for experienced statisticians or statisticians with advanced degrees is increasing. Celerion's most successful strategy for filling our ever-growing need for experienced statisticians has been to hire talented candidates early in their career and provide them the training, mentoring and guidance to grow into successful, well-established clinical trial Biostatisticians. The University of Nebraska-Lincoln's plan to provide an Undergraduate degree in statistics with a solid foundation in statistical methods as well as computation fits perfectly with Celerion's strategy. For this reason, I am delighted to provide my support in the creation of this undergraduate degree program.

Thank you for the opportunity to express my support. Should you need any additional details regarding Celerion or our interactions with the University of Nebraska-Lincoln Department of Statistics, please do not hesitate to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Michelle L. Combs".

Michelle L. Combs, PhD  
Vice President, Data Management and Biometrics  
Celerion





To: University of Nebraska-Lincoln  
From: Tim Hesterberg

Google Inc.  
601 N. 34th St.  
Seattle, WA 98103

google.com

To whom it may concern:

I am writing in support of the proposed new University of Nebraska-Lincoln undergraduate major or degree in "Statistics and Data Analytics".

The program appears to me to be generally well designed. It may be a bit light on computing - it does include Stat 151, 251, 351, total of 7 credits, and other courses will include computing. But it is not clear to me that it includes enough programming (R and Python, and some SQL) and basic software engineering (source code control, testing). Someone with a data analytics degree should be able to do enough programming to wrangle data (this is covered) and pull data from unstructured sources. (\*)

(\*) I wrote the above based on the program description. I subsequently reviewed the syllabi for Stat 151, 251, 351 and 451. These do include R and Python, source code control, databases including SQL, testing, text data, complex data, pulling data from websites, and image data. So the program does include the areas I highlighted.

Conversely, the lack of formal computer science courses does not concern me. Many CS courses are not appropriate for a bachelor's degree in data analytics. One that is appropriate, "artificial intelligence", is frankly usually little more than a fancy name for what computer scientists call machine learning and statisticians call regression and classification, and that is represented appropriately in this major.

I like the emphasis on communication. Modern work in industry almost always involves work in teams, and effective communication is critical. The four primary hiring criteria for data analytics at Google are:

- \* Statistics
- \* Computing
- \* Data Intuition (can you work with data and discover what it says)
- \* Communication

and they are weighted equally.

I will call out three courses for special mention:

- \* Stat 325 - Statistical Collaboration - this is good preparation for communication and teamwork.
- \* Stat 212 - Principles of Study Design - understanding how to design data collection to avoid bias is a critical skill, where software engineers and people with data analytics degrees that are light on statistics are often lacking.
- \* Stat 301-302, in particular the Bayesian components - this is important for two reasons. One, it provides students with a quantitative approach to a critical thinking skill, how to combine prior

information with new evidence from data. Second, Bayesian methods are particularly useful in modern study design in high tech fields, where data is collected over time and estimates continually updated.

At Google we would love to hire more people with a good background in experimental and sample design. And more generally, we have a hard time hiring enough people with good statistics backgrounds.

There is a huge demand for data analytics. This program would put graduates in a good position to be competitive for data analytics jobs, to succeed in the workplace, and to provide good value to their employers and society.

The traditional path to a career in statistics was to major in mathematics as an undergraduate, then do graduate study in statistics. But mathematics is now less critical due to increased use of statistical methods that substitute compute simulation for theory, and we are beginning to see more good programs in statistics and data analytics at lower levels. This program would be a welcome addition. It is weaker in CS and stronger in statistics than other programs, but that would balance other programs that lean the other direction. And graduates would be prepared to work in teams, with colleagues with complementary skills.

Let me add a personal note. I grew up in rural Minnesota, and worked summers on Grandpa's farm in Iowa. I'm concerned about the future of agriculture - due to climate change, and because the current golden age of easy no-till agriculture enabled by Roundup-ready crops won't last, as more weeds become resistant. Nebraska in particular may be hit hard by the combination of climate change and depletion of the Ogallala Aquifer. Continued food production and rural prosperity will need a lot of research to adapt to changing conditions, and new ways of farming - e.g. development of higher-yield perennial crops, and weed control without traditional plowing, disking and cultivation. Data analytics will play a critical role in this work.

About me - I currently work at Google, worked previously at a statistical software company, a gas/electric utility, and in academia. My short (humorous) bio is at <https://research.google/people/TimHesterberg>, and a resume is at <http://www.timhesterberg.net/home/HesterbergResume.pdf>

Sincerely yours,

A handwritten signature in cursive script that reads "Tim Hesterberg".

Tim Hesterberg  
Senior Data Scientist, Google



Department of Statistics  
College of Sciences  
Campus Box 8203  
2311 Stinson Drive  
Raleigh, NC 27695-8203

Leonard A. Stefanski  
P: (919) 515-1945  
F: (919) 515-7591  
[stefansk@ncsu.edu](mailto:stefansk@ncsu.edu)  
<https://statistics.sciences.ncsu.edu/>

February 3, 2021

Bertrand Clarke  
Professor, Department Chair  
Department of Statistics  
University of Nebraska - Lincoln  
Lincoln, NE 68588

Dear Professor Clarke:

I welcome the opportunity to write in support of your proposed undergraduate major in Statistics and Data Analytics. At NC State we have had an undergraduate major in Statistics since before I joined the department in 1986. In the last 35 years I have seen the size of our program ebb and flow for much of its existence, but the last ten years has witnessed phenomenal interest and growth in both our undergraduate major and minor programs.

In response to the increased demand from students for quantitative and computational training especially as relates to big-data applications, many universities and colleges with little or no experience or faculty expertise in the relevant areas are adding programs in data analytics, or data science, or informatics, etc. Thus it is a welcome relief to see the addition of a well-conceived program from a department with a long history of excellence in graduate training in Statistics, and possessing the faculty qualified to ensure its success.

Your proposed program provides the same level of training as ours with similar mathematics and computer science requirements, and a similar number of required credits in statistics proper. So, I expect that the training received by your future students will be as thorough and rigorous as the training in Statistics that has served our students so well for so long.

Where your proposed program differs from ours is its orientation. Ours is focused on statistical theory and methodology with attention to applications. Yours is focused on the practice of statistics and data analytics, as well as collaboration with other scientists. As such, on the surface your program looks to be somewhat more applied. However, judging from your course descriptions, you require the same volume of theory and methodology that we do. If there is a difference, you seem to require a wider scope of methodology and less theory, whereas we currently require more theory and a slightly narrower scope of methodology. The difference in orientation is also borne out in the way that your proposed program includes courses specifically dedicated to collaboration and communication within the discipline. Both programs included advised credits, which allow the students to customize the degree to fit their particular educational goals.

I think it is noteworthy that even though there are differences between our current program

and your proposed program, those differences will fade with time because we are in the process of developing courses for a minor in data science/analytics that will give our students the option of courses that will provide them the wider scope of modern methodology that you have designed into your proposed program. In that sense, your program anticipates future directions to which we too are responding.

NC State students are attracted to our undergraduate major because of the favorable prospects for lucrative employment upon graduation, coupled with the option of continuing their academic training in graduate school. Because your proposed program is similar to ours in that it will provide solid training in core theory and methodology, yet with a modern emphasis on the practice of statistics and data analytics, and collaboration and communication, I expect that the undergraduates at UNL will find it very attractive for the same reasons our undergraduate program continues to grow—the future of statistics and data analytics is bright.

Sincerely,

A handwritten signature in cursive script, appearing to read "L. A. Stefanski".

Leonard A. Stefanski  
Department Head  
R. A. Fisher Distinguished Professor  
of Statistics



May 29, 2020

To Whom It May Concern:

I am writing this letter in strong support of the proposed Statistics and Data Analytics major at the University of Nebraska at Lincoln (UNL). At the Department of Statistics at Penn State I have served as Department Head since 2018 and Director of Undergraduate Studies between 2012 and 2016. This academic year we had 256 students in our BS program in statistics, 42 students in our interdisciplinary statistical modeling data science major, and 135 students minoring in statistics. The demand for these majors continues to grow both due to the heavy demand for their skills as well as because of the growing excitement and interest surrounding the closely related subjects of statistics, data science, and machine learning. I therefore understand well the tremendous value of the undergraduate program being proposed at UNL. The proposal for the new Bachelor of Science in Statistics and Data Analytics is very well thought out and contains both the vision as well as the requisite detailed planning in order to be successful. There is no question that it is prudent to move forward with approving this major as soon as possible.

By now it has become a cliché that we live in a data-rich age. The demand from the private and public sectors for graduates who are skilled at statistics, data analysis, or machine learning has been very high for a number of years, and will continue to grow. These graduates are highly sought after by business companies of all kinds, engineering firms, start-up companies, as well as in the health and pharmaceutical sectors, and in many branches of government. These graduates are at the forefront of innovation in business, in science and technology, and healthcare, to name just a few examples of how statistics and data analytics play an important role in some of the most important and rapidly evolving sectors of the economy. Demand far outstrips the number of qualified graduates. There is also an enormous amount of excitement among students to study statistics and data analytics, starting from high school, thanks to the ubiquity and importance of statistics and data science, along with the very closely related terms “analytics” and “informatics”, in business, science, and sports, as well as in our popular press and culture. At Penn State, for instance, not only has the growth in numbers been rapid and sustained over the past decade, but we are seeing that many of the top students are increasingly attracted to majoring in statistics and data analytics, sometimes as the sole major, sometimes as a double major.

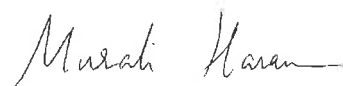
Twenty first century statisticians and data scientists need training in the following areas: (1) statistical thinking: how to think about observations, uncertainty, sampling design, statistical modeling, the mathematical and statistical rigor and depth to carry out a complex data analysis using modern statistical methods; (2) computing/data wrangling: how to process and work with complicated, messy, and potentially massive data sets and carry out sophisticated and complex statistical analyses by writing and developing

computationally expedient algorithms, and (3) communication: how to interact with people from a wide variety of domains to understand the problem that needs to be solved, how to translate that problem into the language of statistics, and then communicate those ideas broadly and obtain practical conclusions. Under the section titled Details as well as from the description of their curriculum and course plans, particularly the example four-year plan for a student, the proposal makes it abundantly clear that the new UNL program will provide the students with precisely this set of crucial skills; the plan includes courses and learning outcomes that address each of the areas I list above. Their courses and topics listed for each of the courses has a lot of similarities with our program. It is good to see, for instance, that UNL's proposal includes courses that build both statistical and computing skills. In the proposal there are courses specifically on data wrangling and computing, as well as technical communication; courses in the former category have only been added to Penn State's program over the past 4 years while on the latter front we are still working on more ways to incorporate communication into our major.

In summary, it is apparent that there is a very strong case for why UNL should have such a major as soon as possible. As the flagship university of the state, it is imperative to have a major that addresses fundamental societal/economic needs. The Department of Statistics is also the best place to train students in this field and the collaborative nature of the discipline in general, and the faculty in this department in particular, put it in an ideal place to train students to be collaborative and to pick up the set of skills they need to succeed. This program will attract many strong students to UNL and will be of great value to those who are already there or planning to attend. It will also benefit the economy, both locally in Nebraska as well as nationally. As is apparent from state universities across the country, particularly similar landgrant institutions like Iowa State, Ohio State, and Penn State, there is enough demand that as soon as the major is created it will immediately attract many students. The Department of Statistics at UNL already has a well formulated plan and vision, as well as the necessary expertise (faculty and graduate students) to rapidly implement their plan for a high quality degree program.

Please do not hesitate to contact me if you have any further questions.

Sincerely,



Murali Haran  
Professor and Head  
Department of Statistics  
Pennsylvania State University  
email:mharan@stat.psu.edu  
814-863-8126



**TABLE 1: PROJECTED EXPENSES - NEW INSTRUCTIONAL PROGRAM  
UNL BS in Statistics and Data Analytics**

|                                | (FY2022)<br>Year 1 |         | (FY2023)<br>Year 2 |         | (FY2024)<br>Year 3 |         | (FY2025)<br>Year 4 |         | (FY2026)<br>Year 5 |         | Total           |
|--------------------------------|--------------------|---------|--------------------|---------|--------------------|---------|--------------------|---------|--------------------|---------|-----------------|
|                                | FTE                | Cost    | FTE                | Cost    | FTE                | Cost    | FTE                | Cost    | FTE                | Cost    | Cost            |
| <b>Personnel</b>               |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Faculty                        |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Professional                   |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Graduate Assistants            |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Support Staff                  |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Benefits                       |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Subtotal                       | 0.0                | \$0     | 0.0                | \$0     | 0.00               | \$0     | 0.00               | \$0     | 0.00               | \$0     | \$0             |
| <b>Operating</b>               |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| General Operating <sup>1</sup> |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 | \$25,000        |
| Equipment                      |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Library/Information Resources  |                    |         |                    |         |                    |         |                    |         |                    |         |                 |
| Subtotal                       |                    |         |                    |         |                    |         |                    |         |                    |         | \$25,000        |
| <b>Total Expenses</b>          |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 |                    | \$5,000 | <b>\$25,000</b> |

<sup>1</sup> Support for recruiting materials, web page development, recruiter travel, and development of advising materials. We anticipate these costs to be consistent through the first 5-years of the program.

**TABLE 2: PROJECTED REVENUES - NEW INSTRUCTIONAL PROGRAM  
UNL BS in Statistics and Data Analytics**

|   | (FY2022)<br>Year 1             | (FY2023)<br>Year 2 | (FY2024)<br>Year 3 | (FY2025)<br>Year 4 | (FY2026)<br>Year 5 | Total              |
|---|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|   | Reallocation of Existing Funds |                    |                    |                    |                    |                    |
| Required New Public Funds               |                                |                    |                    |                    |                    |                    |
| 1. State Funds                          |                                |                    |                    |                    |                    |                    |
| 2. Local Tax Funds (community colleges) |                                |                    |                    |                    |                    |                    |
| Tuition and Fees <sup>1</sup>           | \$55,980                       | \$185,070          | \$443,250          | \$684,300          | \$869,370          | \$2,237,970        |
| Other Funding                           |                                |                    |                    |                    |                    |                    |
| <b>Total Revenue</b>                    | \$55,980                       | \$185,070          | \$443,250          | \$684,300          | \$869,370          | <b>\$2,237,970</b> |

<sup>1</sup> Tuition calculations based on 2020-21 tuition estimates (\$259/credit hour for resident students; \$830/credit hour for non-resident students) assuming 30 credit hours per student per academic year. Projected student enrollment: 2022-23 (5 new students), 2023-24 (10 new students; 15 total), 2024-25 (20-students; 35 total), 2025-26 (20 new students; 55 total), and 2026-27 (20 new students; 70 total). Projected revenue is using the Fall 2019 proportion of resident vs. non-resident undergraduate students in CASNR (72.7% resident and 27.3% non-resident).