



**ACADEMIC PROGRAM PROPOSAL FORM**

*(Revised: May 2019)*

**DIRECTIONS:** Use this form when proposing a new major or primary field of study, new emphasis (BAS only), or new degree or certificate (30+ credits) program. For more detail on the NSHE program approval process, see the last page of this form.

**DATE SUBMITTED:** May 15, 2020

*Date of AAC Approval:*  
**06-10-20**

**INSTITUTION:** Nevada State College

**REQUEST TYPE:**       New Degree  
                                  New Major or Primary Field of Study  
                                  New Emphasis (BAS only)

*Date of Board Approval:*

**DEGREE: Check applicable box**

- |   |  |
|---|--|
| <input type="checkbox"/> Certificate: 30+ Credits           | <input type="checkbox"/> Associate of Arts (AA)              |
| <input type="checkbox"/> Associate of Science (AS)          | <input type="checkbox"/> AA/AS                               |
| <input type="checkbox"/> Associate of Applied Science (AAS) | <input type="checkbox"/> Bachelor of Applied Science (BAS)   |
| <input checked="" type="checkbox"/> Bachelor of Arts (BA)   | <input checked="" type="checkbox"/> Bachelor of Science (BS) |
| <input type="checkbox"/> Master of Science (MS)             | <input type="checkbox"/> Master of Arts (MA)                 |
| <input type="checkbox"/> Doctor of Philosophy (Ph.D.)       | <input type="checkbox"/> Other or Named Degree: _____        |

**MAJOR OR PRIMARY FIELD OF STUDY** (i.e. Animal Science): Data Science

**INCLUDED IN LAST NSHE PLANNING REPORT:**  Yes     No  
(Website for NSHE Planning Reports: <https://www.nevada.edu/ir/page.php?p=planning>)

**TOTAL NUMBER OF CREDITS TO PROGRAM COMPLETION:** 120

**PROPOSED SEMESTER/TERM OF IMPLEMENTATION:** Fall 2021

**Action requested (specify full program title):**

This proposal requests the addition of a Bachelor of Arts and Bachelor of Science in Interdisciplinary Data Science at Nevada State College. Given the degree of overlap between the proposals, one of which is designed to improve access (the B.A.) and another that is slightly more technical in nature (the B.S.), both programs are being included in this single form.

**A. Brief description and purpose of proposed program. For proposed certificates (30+ credits), provide any existing degree or program under which the certificate falls.**

The Interdisciplinary Data Science Degree at Nevada State College will provide students with the knowledge and skills needed to thrive in a world where data and information are more abundant than ever before. Every webpage that you visit, every message you send, and every purchase you make leaves a data footprint. As this world of information continues to expand, from “smart” televisions to autonomous vehicles, the ability to understand, analyze, and visualize data will have a growing importance in a variety of careers.

Data science often is viewed as weaving together data analysis, critical thinking, and programming skills to pursue questions related to data and information in virtually any field. The problem-solving and data exploration techniques of data science are being used by sociologists to understand human interactions, by biologists to understand the human genome, and by businesses to understand customer behaviors, and are increasingly important in fields ranging from health care to professional sports. Students who graduate from Nevada State’s program will be well-versed in data management and analysis, but also will possess the ability to create data reports and visualizations that can help other stakeholders understand complex information and make evidence-based decisions.

As data science has left the purely technical realm and entered into the marketplace, the importance of strong communication skills and critical thinking abilities also has emerged as a key factor for employment and long-term career success. Having a diverse liberal arts background helps students work more effectively with others, improves their problem-solving skills, and gives them the ability to weave a compelling narrative from data.

Because of the breadth of applications of data science, this degree also gives students the flexibility to pursue topics of their own choice as part of the program. Students are required to select at least a minor in some subject area to accompany their major. Some students may choose to pursue a double major, which would also qualify for this requirement.

All students will complete a capstone project to demonstrate the accumulation of both their technical and communication skills. While some of these projects may be ideas that our students have, we would be excited to entertain projects from various local industries that can give our students a more “real-life” data experience.

We are planning to launch the Interdisciplinary Data Science program with two separate but inter-related degrees – a Bachelor of Arts and a Bachelor of Science – to give students more flexibility in their pursuit of a career in Data Science. All students will complete a liberal arts curriculum, including studies in the humanities and social sciences.

The B.A. in Interdisciplinary Data Science is designed for students that intend to enter the job market immediately upon graduation. In accordance with the NSHE strategic plan, the B.A. degree is intended to improve access for various student populations through more flexible requirements in math and statistics, yet it still lays the foundation for a promising career path. The coursework will establish a broad set of both technical skills and professional skills, including an expanded capacity for both oral and written communication, as well as the visual presentation of data. This will provide students with the necessary foundation to begin at the ground level, but also will position them to take advantage of opportunities for upward mobility as they gain experience.

The B.S. in Interdisciplinary Data Science is aimed at students who want a deeper understanding of data science. This is better suited for students that may be considering more technical career pathways or graduate school. The expanded mathematical and statistical knowledge in the B.S. allows them to more easily move into research positions and other opportunities that require this

specialized knowledge (e.g., work with machine learning and advanced artificial intelligence applications).

**B. Provide a list and description of institutionally approved expected student learning outcomes**

Upon graduating, students who complete either the B.A. or B.S. in Interdisciplinary Data Science will be able to:

- Ask meaningful questions about data sets.
- Investigate data questions using appropriate measures and methods.
- Use problem-solving to resolve issues such as data hygiene, managing outliers, and other difficulties that can arise in data sets.
- Combine sound methodology and analysis to draw appropriate conclusions from data that help inform good decision-making.
- Communicate the results of data inquiries to a variety of audiences.

**Provide an institutionally approved plan for assessing student learning outcomes**

The College incorporates two primary modes of assessment, with one emphasizing a deeper analysis of student learning (the Nichols method; Nichols & Nichols, 2005) and the other complementing this approach with a broader look at program elements. The former method is referred to as "Outcomes Assessment," and the latter is identified as "Program Assessment."

*Outcomes Assessment*

The process of Outcomes Assessment occurs on a bi-annual basis for all degree programs. In October the Dean of the College of Liberal Arts and Sciences, in consultation with area Department Chairs, selects assessment chairs for each program under review, who in turn select a three-person committee of faculty reviewers. This committee typically consists of three individuals with expertise in the discipline under examination, but often will include a strategically-selected faculty member from outside of the discipline. In broad terms, the committee targets a single learning outcome, randomly selects student "artifacts" (i.e., major assignments) that presumably reflect outcome performance, and then devises a rubric to evaluate the artifacts. The resulting scores and qualitative observations are incorporated into a formal report that describes the strengths and weaknesses of the program and renders suggested revisions. The revisions are implemented and the process begins anew as faculty gauge the extent to which the program has improved.

Several essential methodological elements enhance the quality and consistency of this process:

1. Outcome alignment: Faculty strive to develop clear, concise learning outcomes that reflect meaningful achievements in the area of study. At the outset of each assessment cycle, faculty also are asked to carefully align these learning outcomes with institutional and school-wide missions and consensus goals of the field. In this fashion, we consistently ensure that each program contributes to larger strategic objectives and maximizes each student's potential for success in his or her respective field.

2. Clear rubric: Assessment is most effective if the evaluation of student performance is guided by a rubric that minimizes ambiguity by relying on clear, widely understood definitions and rating scales. A rubric is "a predefined scoring scheme to guide the analysis of student performance or artifacts" (Nicholas & Nichols, 2005, p. 110). It is applied as a set of rules for evaluating student performance, and it establishes a criterion by which the student will be deemed successful (e.g., at least a 3 on a 4-point scale).

To this end, rubrics “set a common understanding among multiple judges about what represents success in student learning” (Nichols & Nichols, 2005, p. 110). The rubric answers fundamental questions about how student performance will be measured, it discriminates between high and low quality student work, and it helps ensure that our judgments are valid and reliable. In general terms, it does this by clearly identifying several criteria by which a student’s performance can be judged (e.g., relied on empirical data, provided a clear thesis statement, etc.) and then by delineating performance levels for each criterion (e.g., unsatisfactory, satisfactory, proficient, & excellent).

3. Random Sampling: A random and robust sample of student work (referred to as “artifacts”) in this circumstance is our best chance of taking a representative snapshot of NSC student performance, and thereby is most likely to guide improvements that assist a broad proportion of our student population. Moreover, the artifacts selected for analysis are “key assessments” – culminating assignments that are designed to showcase important student knowledge and skills.

4. Interrater Reliability: Evaluating student work is an inherently subjective process that is particularly susceptible to the predilections of an individual evaluator. To minimize this subjectivity, each artifact is assessed by multiple independent raters, and the mean of these ratings is the critical outcome variable that guides recommendations about program changes. Moreover, the ratings from each evaluator are held to a high standard of inter-rater reliability to ensure that there is strong agreement among the different ratings, thereby ensuring that the outcome variable is not unduly influenced by the biases of a single individual.

5. Value added: For each outcome we assess a sample of student artifacts from lower division classes and a separate sample from upper division courses. In this fashion we can estimate how much progress students have made over time as a result of the quality of the instruction and curriculum in our law enforcement program.

6. Iterative philosophy: Importantly, the act of assessment does not exist in isolation; rather, it is a process that yields recommendations, the implementation of those recommendations, and a follow-up assessment to determine the effectiveness of the changes. At the close of this basic three-stage cycle, the process begins anew, which in many ways is the only response to a constantly evolving discipline and the ever-changing needs of businesses, organizations, and the community.

#### Program Assessment

In the years between the biannual Outcomes Assessment, faculty examine programs at a broader level. This type of assessment includes a comprehensive report from Institutional Research of the program's "vital signs" (e.g., enrollment, retention, and graduation trends) as well as another method that is tailored to the unique needs of the program. To this end, faculty have implemented program assessments that include audits of assignment quality, student surveys of the program, alumni surveys, and reviews of syllabi across the curriculum.

### **C. Contribution and relationship of program objectives to**

#### **i. NSHE Master Plan / Strategic Goals**

##### **a. Access – *Increase participation in postsecondary education***

The Data Science program is expected to increase participation in post-secondary education, primarily for two reasons. First, the available data suggest that the market for individuals with the provided skill set is substantive and growing, and the availability of promising career paths should attract students to the program (and higher ed in general). Second, improved access is one of the primary reasons we are proposing a Bachelor of Arts in addition to a Bachelor of Science; the B.A. is expected to increase access for our student population because it involves less rigorous course work in math and statistics, yet still provides thorough training in areas that have been identified as “high need” by employers (e.g., essential statistics, data visualization, communication skills).

**b. Success – *Increase student success***

This program greatly contributes to our goal of enhancing student success. It does this primarily by providing two tailored degree pathways that can lead to fulfilling and productive careers in a promising area of study. Furthermore, in delivering the degree, NSC will maintain our longstanding commitment to excellent teaching and learning opportunities. We have hired an assistant professor of Data Science (slated to begin in Aug. 2020) to help build and successfully implement the program, thanks to enhancement funding generously provided by the state, and we plan to add three more full-time faculty by year five of the program, including another who is slated to start when the program launches in fall 2021. Additionally, we have invested in the creation of new computer lab space in the Rogers Student Center to support the programming and statistical work required by the program, and we will offer our full suite of academic support services to students in the program. Our expectation is that this degree will both open doors to career success for graduates of the program and meet a growing workforce need in this region.

**c. Close the Achievement Gap – *Close the achievement gap among underserved populations***

A key component of the Mission and Vision for Nevada State College is our commitment to underrepresented and underserved populations. As of Fall 2019, Nevada State serves over 5400 students, including a significant increase in headcount over the past three years. True to our mission, this growth has resulted in a student population that is diverse in every sense of the word, including a sizable proportion of first-generation (58%) and low-income (47%) students. Historically underrepresented racial and ethnic groups comprise a higher proportion of the college population than the general population in Nevada, and our students are predominantly female, with women making up 75% of the overall student body. Our programs such as Nepantla, TRIO-SSS, Trio Upward Bound and our current \$2.5 million Hispanic Serving Institution grant provide support and utilize proven best practices for supporting underserved populations. Moreover, our full array of academic support services, including the Academic Success Center (tutoring), the Writing Center, the Advising Center, the RISE peer mentor program, and the Course Assistant program, among others, guide their peer support specialists through an extensive 4-day training workshop that focuses on a number of evidence-based practices to promote the success of a diverse student population. Additionally, other campus divisions and initiatives provide essential support to our students, including CARE Team, the MaryDean Martin Library, a food pantry, and our Office of Community Engagement and Diversity Initiatives.

**d. Workforce – *Collaboratively address the challenges of the workforce and industry education needs of Nevada***

The mission of the college includes an effort to “open doors to career success and an enhanced quality of life for a diverse population of students” and our recently approved strategic plan endeavors to create “the critical workforce to grow our regional and state economy.” The Data Science program is being pursued because of its alignment with those goals. Comprehensive data, such as those provided by the “Workforce Blueprint” prepared by the Las Vegas Global Economic Alliance (LVGEA), suggest an increasing need for employees who are skilled in the analysis and

interpretation of data (e.g., out of hundreds of position types, “Market Analyst” and “Management Analyst” were 11<sup>th</sup> and 13<sup>th</sup>, respectively, in their list of “high demand” jobs). Likewise, conversations with industry leaders from organizations that include Switch, MGM, and the Southern Nevada Health District suggest a growing demand for individuals with the data science experience offered by this degree, and a desire to produce these individuals within our own state. Relative to “home grown” employees, they contend that the cost of attracting out-of-state employees is higher, and the retention rate lower.

**e. Research – *Co-develop solutions to the critical issues facing 21<sup>st</sup> century Nevada and raise the overall research profile***

This is not one of the foremost goals of this program at this time, but may be a greater focus as the program matures.

**ii. Institutional mission and core themes**

Our institutional mission states: "At Nevada State College, excellence fosters opportunity. Excellence in teaching leads to innovative, technology-rich learning opportunities that promote the acquisition of interdisciplinary knowledge and skills. Quality, affordable degree programs open the door to career success and enhanced quality of life for a diverse population of students. Our graduates, in turn, foster the greatest opportunity – the promise of a stronger community and a better future for all of Nevada."

The Data Science program is well-aligned with our mission. It is rooted in interdisciplinary knowledge and skills, maintains the quality and affordability our students expect, and increases opportunities for career success and an enhanced quality of life by providing a viable degree path toward promising career opportunities. Ultimately, successful students should address workforce needs for individuals skilled in the analysis and interpretation of data in industries that enhance civic and economic outcomes in our state.

**iii. Campus strategic plan and/or academic master plan**

Nevada State College's 2019-2023 Planning Report lists a B.S. in Data Informatics. It is the same degree as proposed here, except “Data Science” is now seen as more appropriate terminology than “Data Informatics” (and we now include the B.A. option in addition to the B.S.). The proposed Data Science program also aligns with our 2020-2025 strategic goal of developing distinctive academic programs with the potential to transform students’ lives and enrich the community.

**iv. Other programs in the institution**

The Data Science program interfaces with several other disciplines, including Business, Environmental and Resource Science, Biology, and Mathematics. This will be the flagship program on campus with programming/computer science and data analysis as core competencies, and it opens up future opportunities for multidisciplinary sub-concentrations, such as bioinformatics, business analytics, environmental informatics, and statistics.

**v. Other related programs in the System**

Below is a listing of related programs. However, in our assessment the proposed program would be unique in this system at the bachelor’s level, especially with it’s emphasis on statistics, problem-solving, communication skills (alongside other “soft skills”), and the visualization/reporting of data.

BA/BS in Computer Science, University of Nevada, Las Vegas  
 MS in Computer Science, University of Nevada, Las Vegas  
 PhD in Computer Science, University of Nevada, Las Vegas  
 BSBA in Information Management, University of Nevada, Las Vegas  
 BS in Information Systems, University of Nevada, Reno  
 Masters in Management Information Systems, University of Nevada, Las Vegas  
 MS in Statistics and Data Science, University of Nevada Reno  
 PhD in Statistic and Data Science, University of Nevada, Reno

**D. Evaluation of need for the program**

**i. The need for the program and the data that provides evidence of that need**

As noted above, this program addresses an area of strong and increasing need in the regional workforce, as indicated by conversations with area industry leaders and comprehensive workforce reports. For example, the need for a program of this nature has been clearly and consistently expressed by representatives from companies and organizations with a strong presence in Southern Nevada, including Switch, MGM, Konami, and the Southern Nevada Health District, among others. Moreover, in developing the program we consulted with these and other representatives about the knowledge and skills they would want to see in a prospective employee, and modified our curriculum accordingly.

As noted above, data provided by the LVGEA in their workforce blueprint indicates an increasing need for employees who are skilled in the analysis and interpretation of data (e.g., out of hundreds of position types, “Market Analyst” and “Management Analyst” were 11th and 13<sup>th</sup>, respectively, in their list of “high demand” jobs). Furthermore, market research conducted for Nevada State College by *Hanover Research* has shown that the growth rate in Nevada for jobs in this field is 28.3%, nearly four times the national average for all occupations. Naturally, this analysis was conducted prior to the COVID-19 pandemic, but we expect that the need for individuals who can properly assess and report data may only increase in the wake of this crisis, relative to other occupations.

## Total Labor Market

*Aggregate informatics/data science-related job availability by geographic level*

	Nevada	Far West	National
Baseline Year Employment	21,790	699,820	3,752,900
10-Year Projected Employment	27,950	872,130	4,303,100
<b>Growth Rate</b>	<b>28.3%</b>	<b>24.6%</b>	<b>14.7%</b>
<b>Total Annual Openings</b>	<b>1,130</b>	<b>31,830</b>	<b>349,000</b>

Note: The Far West Region includes Alaska, California, Hawaii, Nevada, Oregon, and Washington.

Source: Projections Central<sup>3</sup>

## **ii. Student population to be served**

Nevada State College is known for its commitment to serving a diverse student population. In Fall 2019, 75% of our students self-identified as female and 58% of our students self-identified as the first in their families to attend college. Our current enrollment reflects a higher than national average of students from diverse ethnic and cultural backgrounds, including a very high number of Hispanic students. In fall 2019, 63% of our entire student population self-identified as belonging to a minority group and 37% self-identified as Hispanic. The addition of this program offers these students a new path to a graduate degree and new opportunities for high-paying, fulfilling career opportunities. Overall, Data Science is a technical program in nature, and may be most amenable to students with an affinity for computer programming and statistical analysis, but the addition of a B.A. pathway is designed to open doors to students who otherwise might steer clear of this kind of program because of exceptionally rigorous math requirements. Our discussions with external stakeholders in business indicate that students can be very successful at different levels of math/programming aptitude, especially if we help round out their skill sets in areas such as communication and data visualization (e.g., producing data charts and presentations).

## **iii. Procedures used in arriving at the decision to offer the program**

The decision to offer the program stems, first and foremost, from an over-arching strategic decision to focus our resource investments on degree pathways that offer promising opportunities to a significant population of students. The determination that Data Science met these guidelines derived from data (noted in section E.i above) indicating that job opportunities in this field significantly outpace opportunities in other fields, on average. If anything, we believe these projections may *underestimate* the need for individuals with these skill sets because the range and complexity of data that need to be analyzed in the modern world is only going to increase over time, as will the tendency for people in leadership positions to use these data for decision-making (we hope!).

## **iv. Organizational arrangements required within the institution to accommodate the program**

Organizationally, this program will be housed in the School of Liberal Arts and Sciences; at the moment, it is under the Physical and Life Sciences department, but we are working on plans to create an entirely new department that merges Data Science, Visual Media, and Communication, which we expect will be the long-term home for the program.

## **v. The timetable, with dates, for implementation steps**

March 31, 2020 - Faculty Senate provided final approval of the degree proposal

April 20, 2020 - The NSC Provost provided the final approval for the degree proposal

June 10, 2020 - The Academic Affairs Council of the NSC Board of Regents evaluates the Academic Program Proposal Form and provides feedback.

September 9, 2020 - The Academic Affairs Council of the NSC Board of Regents provides final approval of the Academic Program Proposal Form

September 11, 2020 - The Board of Regents provides final approval of the Academic Program Proposal Form.

Spring 2021 - NSC begins accepting applications for the fall 2021 semester

August 2021 - NSC begins its first semester of the program



**vi. If this or a similar program already exists within the System, what is the justification for this addition**

While there are Master's and Ph.D. programs in NSHE, there are currently no Bachelor's level Data Science programs. The most similar programs are the Computer Science and Information Management programs at UNLV. The B.A./B.S. Data Science program that we are proposing is distinct from both of these in several ways.

The Computer Science program places a higher emphasis on computer infrastructure and other skills that are more relevant to a computer engineering/data engineering pathway. Our program focuses on developing skills of data analysts, which is a skillset more focused on data visualization and communication than it is on database construction and information management.

The Information Management program is a sub-discipline of the Business program, which is oriented around business outcomes. Our program is interdisciplinary by design, and designed to interface with data rich disciplines beyond business, such as biology and psychology.

**vii. Evidence of employment opportunities for graduates (state and national). Include information on institutional review of the need for the program based on data from the Nevada P-20 Workforce Research Data System ([https://www.nevada.edu/ir/strategic\\_plan.php?metric=spm4&mid=workforce\\_demand](https://www.nevada.edu/ir/strategic_plan.php?metric=spm4&mid=workforce_demand)), including the supply/demand reports at <http://npwr.nv.gov/reports/student-completion-and-workforce-part-ii/>.**

“Data Science” does not specifically show up in the reports of in-demand occupations listed on this [NSHE website](#). However, this may be a function of the newness of the field, and the variety of monikers that have been used historically to capture this skill set (e.g., informatics, data analytics, data science). To that point, “data science” does not show up in the provided [website](#) on supply/demand reports. That being said, related fields that are identified, such as those in computer and information sciences, tend to yield higher than average salaries and an “in-demand” profile. Also, as we note in other sections of this document, reports on workforce demand and insights from prospective employers suggest that the need for employees with this background is significant and expected to increase over time.

**E. Detailed curriculum proposal**

**i. Representative course of study by year (options, courses to be used with/without modification; new courses to be developed)**

As noted above, to maintain an interdisciplinary structure for our degree, we will be requiring all students to graduate with at least an 18-credit minor in an area other than data science. This equates to 6 or more courses within a particular discipline. Based on current enrollment trends, we expect that many students will likely pair a data science degree with business, psychology, or biology. In addition to the discipline-specific coursework above, students will have to complete courses that constitute the Data Science major itself. The coursework for the B.A. and the B.S. overlap significantly, but there are some differences based on the goals for the different degrees.

Below we detail the full curriculum for each degree pathway, and then subsequently explain the key differences between each program.

### **B.A. Interdisciplinary Data Science Projected Degree Pathway**

Courses are generally 3 credits each. Students can graduate in 4 years (Fall/Spring attendance only) if they take 5 courses per semester. The courses in bold are either new courses or proposed changes to existing course offerings.

- Fall Semester 1
  - MATH 126: Precalculus 1
  - **Core Curriculum Course (Math – STAT 152: Introduction to Statistics)**
  - **DATA 101: Introduction to Data Science**
  - Core Curriculum Course (English)
  - Core Curriculum Course (Study and Technology Skills)
- Spring Semester 1
  - MATH 127: Precalculus 2
  - **DATA 220: Research Methods for Data Science**
  - Minor Course #1
  - Core Curriculum Course (Fine Arts)
  - General Elective
- Fall Semester 2
  - **CS 135: Computer Science 1**
  - Professional Skills Course #1
  - Minor Course #2
  - Core Curriculum Course (Natural Sciences #1)
  - General Elective
- Spring Semester 2
  - **CS 202: Computer Science 2**
  - Professional Skills Course #2
  - Core Curriculum Course (Natural Sciences #2)
  - Minor Course #3
  - General Elective
- Fall Semester 3
  - **DATA 210: SQL for Data Science**
  - **DATA 320: Introduction to Mathematical Modeling (Elective 1)**
  - Professional Skills Course #3
  - Minor Course #4
  - Core Curriculum Course (Constitution)
- Spring Semester 3
  - **DATA 310: Data Visualization**
  - Minor Course #5
  - Core Curriculum (Humanities #1)
  - General Elective
  - General Elective
- Fall Semester 4
  - **DATA 330: Statistical Methods for Data Science**
  - **DATA 410: Exploratory Data Analysis (Elective 2)**
  - Minor Course #6
  - Core Curriculum (Humanities #2)
  - General Elective

- Spring Semester 4
  - **DATA 480: Data Science Capstone**
  - Core Curriculum (Social Science)
  - Core Curriculum (Cultural Diversity)
  - General Elective
  - General Elective

### **B.S. Interdisciplinary Data Science Projected Degree Pathway**

Courses are generally 3 credits each. Students can graduate in 4 years (Fall/Spring attendance only) if they take 5 courses per semester. The courses in bold are either new courses or proposed changes to existing course offerings.

- Fall Semester 1
  - MATH 181: Calculus 1
  - **Core Curriculum Course (Math – STAT 152: Introduction to Statistics)**
  - **DATA 101: Introduction to Data Science**
  - Core Curriculum Course (English)
  - Core Curriculum Course (Study and Technology Skills)
- Spring Semester 1
  - MATH 182: Calculus 2
  - **DATA 220: Research Methods for Data Science**
  - Minor Course #1
  - Core Curriculum Course (Fine Arts)
  - General Elective
- Fall Semester 2
  - **CS 135: Computer Science 1**
  - Professional Skills Course #1
  - Minor Course #2
  - Core Curriculum Course (Natural Sciences #1)
  - General Elective
- Spring Semester 2
  - **CS 202: Computer Science 2**
  - Math 330: Linear Algebra
  - Professional Skills Course #2
  - Core Curriculum Course (Natural Sciences #2)
  - Minor Course #3
- Fall Semester 3
  - **DATA 210: SQL for Data Science**
  - **DATA 320: Introduction to Mathematical Modeling (Elective 1)**
  - Professional Skills Course #3
  - Minor Course #4
  - General Elective (Constitution)
- Spring Semester 3
  - **DATA 310: Data Visualization**
  - Minor Course #5
  - Core Curriculum (Humanities #1)

- MATH 352: Probability and Statistics
- General Elective
- Fall Semester 4
  - **DATA 330: Statistical Methods for Data Science**
  - Minor Course #6
  - Core Curriculum (Humanities #2)
  - General Elective
  - General Elective
- Spring Semester 4
  - **DATA 480: Data Science Capstone**
  - Core Curriculum (Social Science)
  - Core Curriculum (Cultural Diversity)
  - General Elective
  - General Elective

*B.A. vs. B.S. comparison*

The B.A. Interdisciplinary Data Science degree is mainly targeted at students considering a career path that starts as a data analyst. The B.S. degree is a more rigorous curriculum that gives students the skills they would need to follow more technical career pathways, such as graduate school or work on artificial intelligence and machine learning.

Several key distinctions between the two programs are outlined below.

	<b>B.A. Degree</b>	<b>B.S. Degree</b>
Math requirement	Precalculus	Calculus Linear Algebra
Career Pathway Entry Point	Data Analyst	Data Analyst Data Engineer Graduate School
Graduate school options	MBA (after gaining industry experience)	Graduate school (both hard/soft sciences) MBA (after gaining industry experience)
Machine Learning and Artificial Intelligence	Less advanced preparation	Stronger preparation

**ii. Program entrance requirements**

There are no specific requirements for entrance to this major outside of the minimum entrance requirements for admission to Nevada State College (e.g., a HS GPA above 2.5).

**iii. Program completion requirements (credit hours, grade point average; subject matter distribution, preprogram requirements)**

*Bachelor of Arts in Interdisciplinary Data Science*

College Core Curriculum: 31-43 credits

Major Requirements: 47 credits plus 18 credit minor

General Electives: 12-24 credits

Total Credits: 120

- 1) 60 credits toward degree must come from a four (4) year institution.
- 2) At least 32 credits must be completed in Upper Division work from Nevada State College. To graduate, students must have a minimum cumulative GPA of 2.0, including all post-secondary coursework attempted. Additionally, students must earn a Nevada State College overall GPA of at least 2.0.

*Bachelor of Science in Interdisciplinary Data Science*

College Core Curriculum: 31-43 credits

Major Requirements: 47 credits plus 18 credit minor

General Electives: 12-24 credits

Total Credits: 120

- 1) 60 credits toward degree must come from a four (4) year institution.
- 2) At least 32 credits must be completed in Upper Division work from Nevada State College. To graduate, students must have a minimum cumulative GPA of 2.0, including all post-secondary coursework attempted. Additionally, students must earn a Nevada State College overall GPA of at least 2.0.

**iv. Accreditation consideration (organization (if any) which accredits program, requirements for accreditation, plan for attaining accreditation - include costs and time frame)**

No program-specific accreditation is associated with this degree.

**v. For certificates only: Name of any state, national and/or industry recognized certification(s) or licensing examination(s) for which certificate prepares the student, if applicable**

Not applicable

**F. Method of Delivery (for the purpose of state authorization [NC-SARA])**

**i. How will this academic program be delivered when the program begins?**

(mark all that apply)

100% face-to-face courses

Hybrid (some online courses, some face-to-face courses)

100% online courses

**ii. Learning Placements**

Does the academic program have learning placements (e.g. internships, externships, clinical placements, student teaching, etc.) that *may take place outside the state of Nevada*?

Yes

No.

**G. Institutional Review Process**

**i. Date of Faculty Review (may include additional information, as needed)**

March 31, 2020 – Faculty Senate provided final approval of the degree proposal

**ii. Describe the process for review and approval by the appropriate academic policy body of the institution**

Proposals are reviewed and approved by the following:

- Dean of the School
- Faculty Senate via the Curriculum Committee
- Provost and Executive Vice President

## H. Readiness to begin program

### i. List the educational and professional qualifications of the faculty relative to their individual teaching assignments

All tenure-track faculty who are a part of this program will possess terminal degrees in their fields, which in most instances will be a doctoral degree. All lecturers will possess at least a master's degree in a related field. Our one existing data science faculty member, Tim Malacarne, and our contributing faculty member from mathematics, Aaron Wong, both possess a Ph.D. in a relevant field. At present, we have plans to hire four faculty by year 5 of the program, including two assistant professors and two lecturers.

Timothy Malacarne, Ph.D.

Assistant Professor of Data Science

Former Visiting Assistant Professor of Data Science and Sociology, Mount Holyoke College (2017-2020)

Ph.D. in Sociology, Yale University (2012)

Masters of Arts in Sociology, Yale University (2010)

Bachelor of Science in Foreign Service, Georgetown University

Dr. Malacarne comes to Nevada State from a Data Science position at Mount Holyoke, where he was part of developing a data science program. His background in sociology gives him a unique perspective for working with students that come with a weaker quantitative background and without previous exposure to programming, as he entered into Data Science late in his academic studies from an area that is not traditionally known for its quantitative methods. Dr. Malacarne will be taking the lead role in the ongoing process of hiring new faculty for the program. He is currently scheduled to teach the following courses: CS 135 (Computer Science I), CS 202 (Computer Science II), DATA 101 (Introduction to Data Science), DATA 210: SQL for Data Science, DATA 220 (Research Methods for Data Science), DATA 480 (Data Science Capstone).

Aaron Wong, Ph.D.

Associate Professor of Mathematics

Ph.D. in Mathematics, University of California, San Diego (2007)

Masters of Arts in Mathematics, University of California, San Diego (2004)

Bachelors of Science in Mathematics, University of California, Santa Barbara (2002)

Bachelors of Arts in Physics, University of California, Santa Barbara (2002)

Dr. Wong has been teaching at Nevada State since 2007. Over the last 5-6 years, he has been independently developing his knowledge of Data Science. He has received permission to go on sabbatical in Fall 2020 in order to formalize his Data Science knowledge by completing the MIS Data Analytics Certificate at UNLV and pursue direct work experience in the field. He is scheduled to teach the following courses: DATA 310 (Data Visualization), DATA 320 (Introduction to Mathematical Modeling), DATA 330 (Statistical Methods for Data Science), DATA 410 (Exploratory Data Analysis for Data Science), STAT 152 (Introduction to Statistics).

### ii. List the anticipated sources or plans to secure qualified faculty and staff

Our first assistant professor of Data Science was hired following a national search and is initially supported by enhancement funds provided by the legislature. Additional full-time faculty hires, both tenure-track and lecturers, will be secured via national searches conducted by faculty with

expertise in this field and in effective teaching and learning. Funding for these positions will likely come from enrollment-generated state funding.

**iii. Contribution of new program to department's existing programs (both graduate and undergraduate) and contribution to existing programs throughout the college or university**

The Data Science program is the first program at Nevada State to use the major/minor system as an interdisciplinary requirement. We expect to see an increase in the number of minors awarded, particularly in business, biology, and psychology. We also see the Data Science program as a launching point for specific sub-disciplines in various programs, such as data analytics in business and bioinformatics in biology.

**iv. Recommendations from prior program review and/or accreditation review teams**

N/A

**I. Resource Analysis**

**i. Proposed source of funds (enrollment-generated state funds, reallocation of existing funds, grants, other state funds)**

A portion of the funding was provided through an enhancement request to the State. Other funding is expected to be based on enrollment-generated state dollars.

**ii. Each new program approved must be reviewed for adequate full-time equivalent (FTE) to support the program in the fifth year. Indicate if enrollments represent 1) students formally admitted to the program, 2) declared majors in the program, or 3) course enrollments in the program.**

**a. (1) Full-time equivalent (FTE) enrollment in the Fall semester of the first, third, and fifth year.**

**1st Fall semester** 12 FTE (180 SCH/15 SCH = 12)

**3rd Fall semester** 36 FTE (540 SCH/15 SCH = 36)

**5th Fall semester** 72 FTE (1620 SCH/15 SCH = 72)

**(2) Explain the methodology/assumptions used in determining projected FTE figures.**

All headcount and FTE calculations listed in this section reflect the combined total for the Bachelor of Arts and Bachelor of Science degrees added together (e.g., the 12 FTE listed for the 1<sup>st</sup> fall semester is for the BA and the BS combined). To calculate FTE, we first estimated unduplicated headcount totals based on presumed demand for the program, which is expected to be strong given the career opportunities enabled by a degree in this field. A comparable program trajectory at Nevada State is the growth of our Criminal Justice program, but the Data Science degree is expected to have a notably lower rate of growth given the technical nature of the degree. Consequently, we estimate that the program will have unduplicated headcounts of 20 in year 1 (fall 2021), 60 in year 3, and 120 in year 5 through a combination of incoming freshmen and transfer students from the community colleges, and accounting for a degree of attrition from year to year (Criminal Justice, by comparison, exhibited unduplicated headcounts of 78 in year 1, 147 in year 3, and 220 in year 5).

To calculate the FTE, the unduplicated headcount is then multiplied by the average number of expected credit hours for each student, which was estimated at 9 for our student population and includes a fairly even mix of part-time and full-time students (and which aligns with our institutional average of .65 FTE for every 1 headcount). That product is divided by 15 to arrive at the amount of FTE for each fall semester, as shown above.

**b. (1) Unduplicated headcount in the Fall semester of the first, third, and fifth year.**

**1st Fall semester 20**

**3rd Fall semester 60**

**5th Fall semester 120**

**(2) Explain the methodology/assumptions used in determining projected headcount figures.**

As noted above, the figures reported here reflect the combined total of the headcounts for the BA degree and the BS degree added together. Unduplicated headcount totals were estimated based on presumed demand for the program, which is expected to be strong given the career opportunities enabled by a degree in this field. A comparable program trajectory at Nevada State is the growth of our Criminal Justice program, but the Data Science degree is expected to have a notably lower rate of growth given the technical nature of the degree, with its emphasis on statistics and programming. Consequently, we estimate that the program will have unduplicated headcounts of 20 in year 1 (fall 2021), 60 in year 3, and 120 in year 5 through a combination of incoming freshmen and transfer students from the community colleges, and accounting for a degree of attrition from year to year.

**iii. Budget Projections – Complete and attach the Five-Year Program Cost Estimate and Resource Requirements Table.**

See attached cost estimate spreadsheet.

**J. Facilities and equipment required**

**i. Existing facilities: type of space required, number of assignable square feet, space utilization assumptions, special requirements, modifications, effect on present programs**

Nevada State College provides exceptional facilities to serve the needs of students and faculty. The foremost needs for this particular program are 1) general instructional classroom space to offer the required courses (many of which have never been offered at the College), 2) computer lab space for instruction, and 3) computer lab space that is designated for student work outside of the classroom. Regarding the first need, even though general classroom space is an increasingly limited commodity at Nevada State, we still have room to offer additional classes, and the new Education building will further increase our overall capacity to provide instruction. Regarding the second need, we currently have five instructional computer labs on campus, and are considering the conversion of a lecture classroom space into a roughly 30-workstation computer lab space in the Dawson building. Finally, regarding the third need, we currently have 16 desktop computers in the MaryDean Martin Library for student use, as well as the ability to lend out dozens of laptop computers to students in need. Moreover, we recently converted a room on the second floor of the Rogers Student Center into a general use space with over 20 computer



workstations available. The final area where we are space-constrained is in terms of available office space, but that challenge is not unique to this program.

- ii. Additional facilities required: number of assignable square feet, description of space required, special requirements, time sequence assumed for securing required space**  
N/A

- iii. Existing and additional equipment required**

Nevada State College prioritizes the provision of state-of-the-art resources to enhance the learning environment for students. Our “SMART” classrooms feature computing workstations, projectors, speakers, a document camera, Smartboard technologies, and interactive student response systems (iClickers). Aside from the need for additional computer workstations, noted in the preceding section, our classroom technology fully serves the instructional needs of the Data Sciences program. In addition, a lecture-capture system allows faculty to record themselves in the classroom; these videos can be edited and posted online as video lectures in online or hybrid courses.

In 2013, NSC migrated to the Canvas by Instructure learning management system. The ease of use and enhanced functionality this brings to online classes provides an improved learning environment for students. Canvas syncs easily with outside resources (such as Google Drive documents) and mobile apps.

Faculty development sessions and emails and instructional videos from the department chair inform faculty of available resources. Office computers are equipped with programs such as Jing and Camtasia for the creation and editing of video lectures. Campus laptops are also available for checkout as needed. Departmental funds are available to cover specific instructional equipment or materials for courses at an instructor’s request.

Overall, NSC faculty have access to extremely high-quality equipment for developing their courses, and the college remains dedicated to ensuring that our faculty have the resources needed to create innovative, engaging online courses.

**K. Describe the adequacy and availability of library and information resources**

The MaryDean Martin Library supports the teaching, learning, and research needs of the campus by providing access to a wide range of digital information, including approximately 100,000 journals and serials, 1.5 million e-books, and 10,000 streaming video and audio materials. The Library’s collections model emphasizes easy discovery and retrieval of materials in a wide variety of formats. A large percentage of these materials are accessible through a single search platform, Primo, and the Library provides remote access to all online resources.

Generally, these resources adequately meet the needs of a Data Science program at Nevada State College. However, to further support the program, the library is pursuing a subscription to O’Reilly for Higher Education, which is considered the leading provider for books and videos for data science programs. The full annual expense of \$14k (with small inflationary adjustments from year-to-year) is noted in the cost estimate spreadsheet.

**L. Student services**

**i. Describe the capacity of student support services to accommodate the program. Include a description of admissions, financial aid, advising, library, tutoring, and others specific to the program proposal**

In recent years we have expanded our capacity in all areas of student support services, including admissions and recruitment, financial aid, advising, the library, tutoring, the disability resource center, and the writing center. There will always be a desire for additional support, but the current level of staffing has been sufficient to introduce mandatory advising for all incoming students (generally up to 60 credits), improve first through fifth-year retention rates, and increase the utilization of academic support centers such as the Academic Success Center and the Writing Center. Moreover, we have expanded existing platforms that can provide support to all students (e.g., the Smarthinking online tutoring platform), including those who would be enrolled in the HHS degree, and strategically invest in new platforms that further enhance the success of our students (e.g., the recently launched Starfish student management system). These developments give us confidence that we have the support services needed to accommodate the program. The only other concern is to ensure that all student services staff members are well-trained to provide appropriate and helpful guidance to students enrolled in the program, and this is something we will achieve if the program is approved.

**ii. Describe the implications of the program for services to the rest of the student body**

The Data Science program should not have any negative implications for services to the rest of the student body.

**M. Consultant Reports – If a consultant was hired to assist in the development of the program, please complete subsections A through C. A copy of the consultant’s final report must be on record at the requesting institution.**

**i. Names, qualifications and affiliations of consultant(s) used**

**ii. Consultant’s summary comments and recommendations**

**iii. Summary of proposer's response to consultants**

**N. Articulation Agreements**

**i. Articulation agreements were successfully completed with the following NSHE institutions. (Attach copies of agreements)**

Agreements for both the B.A. and the B.S. are being submitted with this proposal.

**ii. Articulation agreements have not yet been established with the following NSHE institutions. (Indicate status)**

**iii. Articulation agreements are not applicable for the following institutions. (Indicate reasons)**

**O. Summary Statement**

Nevada State College proposes to establish a Bachelor of Arts and Bachelor of Science degrees in Interdisciplinary Data Science. Data Science majors will learn to capture, organize, analyze, and communicate information drawn from large data sets, producing knowledge that aids in problem-solving and evidence-based decision-making. The Data Science program prepares undergraduate students to succeed in a variety of career paths as the need for their knowledge and skills will continue to expand in fields ranging from healthcare to business. The Interdisciplinary Data Science degree will offer a unique alternative to embrace interdisciplinary education with a broad exposure to courses in math, computer science, data science, statistics, communication, and management.

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# NSHE Academic Program Proposal - Five-Year Program Cost Estimate and Resource Requirements

Enter N/A if the information is not applicable to the program proposal

Program Resource Requirements. Indicate all resources needed including the planned FTE enrollment, projected revenues, and estimated expenditures for the first, third and fifth fiscal years of the program. Include reallocation of existing personnel and resources and anticipated or requested new resources. Third and fifth year estimates should be in dollars adjusted for inflation. If the program is contract related, explain the fiscal sources and the year-to-year commitment from the contracting agency(ies) or party(ies). Note: This form reflects the NWCCU's Substantive Change Budget Worksheet as of 8/28/17.

College/University: Nevada State College			Program: Interdisciplinary Data Science			
I. PLANNED STUDENT ENROLLMENT						
<b>Note: Enrollment numbers (A + B) for each fiscal year should match the FTE/Headcount numbers in the Academic Program Proposal Form (Sect. I.ii.).</b>	FY 1: FY 2022		FY 3: FY 2024		FY 5: FY 2026	
	FTE	Headcount	FTE	Headcount	FTE	Headcount
A. New enrollments to the Institution <i>(note: these calculations reflect the combined total of the BA degree and the BS degree added together).</i>	12	20	36	60	72	120
B. Enrollments from Existing Programs						
II. REVENUE						
	FY 1: FY 2022		FY 3: FY 2024		FY 5: FY 2026	
	On-going	One-time	On-going	One-time	On-going	One-time
1. New Appropriated Funding Request						
2. Institution Funds	\$201,459		\$445,389		\$523,099	
3. Federal (e.g. grant, appropriation)						
4. New Tuition Revenues (registration fee) from Increased Enrollments*						
5. Other Student Fees (associated with the program)*						
6. Other (i.e., Gifts)						
<b>Total Revenue</b>	\$201,459	\$0	\$445,389	\$0	\$523,099	\$0
<b>Note: Total Revenue (Section I) should match Total Expenditures (Section III)</b>						

## NSHE Academic Program Proposal - Five-Year Program Cost Estimate and Resource Requirements

Enter N/A if the information is not applicable to the program proposal

III. EXPENDITURES		FY 1: FY 2022		FY 3: FY 2024		FY 5: FY 2026	
		On-going	One-time	On-going	One-time	On-going	One-time
<b>A. Personnel Costs</b>							
1. FTE (Total FTE for all personnel types)		1.5	0	4	0	4.8	0
	Faculty	1		3		4	
	Adjunct Faculty	0.5		1		0.8	
	Grad Assts						
	Research Personnel						
	Directors/Administrators						
	Administrative Support Personnel						
	Other: _____						
<b>Expenditures for personnel type below must reflect FTE levels in Section A.1.</b>							
2. Faculty		\$95,000		\$265,302		\$332,928	
		\$24,000		\$48,000		\$38,400	
3. Adjunct Faculty							
4. Graduate Assistants							
5. Research Personnel							
6. Directors/Administrators							
7. Administrative Support Personnel							
8. Fringe Benefits		\$29,640		\$80,967		\$99,531	
9. Other:							
	<b>Total Personnel Costs</b>	\$148,640	\$0	\$394,269	\$0	\$470,859	\$0

## NSHE Academic Program Proposal - Five-Year Program Cost Estimate and Resource Requirements

Enter N/A if the information is not applicable to the program proposal

		FY 1: FY 2022		FY 3: FY 2024		FY 5: FY 2026	
		On-going	One-time	On-going	One-time	On-going	One-time
<b>B. Operating Expenditures</b>							
1. Travel		\$3,000		\$6,000		\$6,000	
2. Professional Services							
3. Other Services							
4. Communications							
5. Materials and Supplies		\$25,000		\$25,000		\$25,000	
6. Rentals							
7. Marketing materials and Advertising							
8. Miscellaneous							
<b>Total Operating Expenditures</b>		\$28,000	\$0	\$31,000	\$0	\$31,000	\$0

## NSHE Academic Program Proposal - Five-Year Program Cost Estimate and Resource Requirements

Enter N/A if the information is not applicable to the program proposal

		FY 1: FY ____		FY 3: FY ____		FY 5: FY ____	
		On-going	One-time	On-going	One-time	On-going	One-time
<b>C. Capital Outlay</b>							
1. Library Resources		\$14,000		\$15,120.00		\$16,240.00	
2. Equipment		\$10,819		\$5,000		\$5,000	
<b>Total Capital Outlay</b>		\$24,819	\$0	\$20,120	\$0	\$21,240	\$0
<b>TOTAL EXPENDITURES (IIIA + IIIB + IIIC):</b>		\$201,459	\$0	\$445,389	\$0	\$523,099	\$0
<b>Note: Total Expenditures (Section IIIA-C total) should match Total Revenue (Section I)</b>							

**Budget Notes (optional):**

The student headcount and FTE figures in section 1, "Planned Student Enrollment," reflect the combined total for the BA degree and the BS degree added together.