NEW ACADEMIC PROGRAM – MAJOR
Preliminary Proposal Form

I. **Program Details**
   a. **Name (and Degree Type) of Proposed Academic Program:** Bachelor of Science in Data Science
      i. **Emphases (if applicable):** Applied Statistics; Comprehensive Statistics; Computer Science; Biology; Neuroscience; (others to be added)
   b. **Academic Unit(s)/College(s):** Department of Mathematics, College of Science
   c. **Campus/Location(s):** Tucson - Main Campus

   d. **First Admission Term** (*i.e., Fall 2024*)**:** Fall 2024
   e. **Primary Contact and Email: P**rofessor Helen Zhang, Chair of the GIDP in Statistics, hzhang@math.arizona.edu; Professor Bryden Cais, Associate Head for Undergraduate Programs, Dept of Mathematics, cais@math.arizona.edu

II. **Executive Summary:** This degree will adapt and replace the existing and successful BS in Statistics and Data Science and allow for emphasis tracks in many areas of science. Students will master key fundamental data-related knowledge and skills in mathematics, statistics, and computer science, and complete interdisciplinary coursework integrating scientific and ethical issues from a domain field with the foundational data-related knowledge. Emphasis tracks are planned in Computer Science, Applied Statistics, Comprehensive Statistics, Biology, Neuroscience, Hydrology, and Astronomy. Some emphases (such as Computer Science or Applied Statistics) will prepare students to enter the workforce in junior data science positions; others (such as Comprehensive Statistics) will prepare students for graduate work in data-related fields. The program leverages the University of Arizona's world-class strengths in Science, Mathematics, Statistics, and Computing with its deep interdisciplinary culture.

Brief Program Description: It is widely understood that data science is central to the advancement of human knowledge in a broad range of endeavors. The focus of the Undergraduate Degree in the Data Science program will be on the mathematical and computational aspects of statistics and data science combined with data, principles, and problems from an application area. The job opportunities for our graduates are extensive and cover many science-related aspects of business, government, and industry. Our students will graduate with strong fundamentals in mathematics, statistics, and programming, and extended knowledge in a core area of science such as more advanced statistics and data science, computer science, biology, astronomy, hydrology, etc.

III. **Program Rationale:** The proposed program is an expansion of and replacement for the existing Statistics and Data Science degree. It will be offered using existing courses in Science, possibly with a few additions as new emphases are added. It is designed to be more broadly accessible to students interested in science than the existing Statistics and Data Science degree. The science emphases of the

new degree require less mathematics and statistics but require more work in the application fields. Future students interested in the Statistics and Data Science program will be equally well served by the Statistical and Computing emphases of the new degree since these are very similar to the existing degree.

IV. **Projected Enrollment for the First Three Years:**

Year 1	Year 2	Year 3
100	150	200

V. **Evidence of Market Demand:** Lightcast reports for CIP codes 30.7001 (Data Science, General) and 30.7101 (Data Analytics, General) include the following estimates for growth in jobs:
   a. Data Scientists in AZ +344.58% (2010 to 2022)
   b. Data Scientists in US +396.60% (2010 to 2022)
   c. Data Scientists in AZ +20.97% (2026 to 2033)
   d. Data Scientists in US +18.37% (2026 to 2033)

VI. **Similar Programs Offered at Arizona Public Universities:** UA: BA and BS in Statistics and Data Science; ASU: BS in Statistics

VII. **Resources**
   a. **Summarize new resources required to offer the program:**. The program will be offered with existing faculty and courses.
   b. **Estimate total expected cost:** No additional cost.
   c. **Estimate total expected revenue of the program:** AIB revenue for 200 majors

VIII. **Required Signatures:**
   a. **Program Director/Main Proposer:**

   i. **Signature:** _____ *Bryden R Cais* _____

   ii. **Name and Title:** Bryden Cais, Professor and Associate Head for Undergraduate Programs, Department of Mathematics

   iii. **Date:** September 20, 2023

   b. **Managing Unit/Department Head:**

  i. **Signature:** _____

  ii. **Name and Title:** Douglas Ulmer, Professor and Head, Department of Mathematics

  iii. **Date:** September 20, 2023

c. **College Dean/Associate Dean:**

  i. **Signature:** _____

  ii. **Name and Title:** Rebecca L Gomez, Professor of Psychology and Cognitive Science, Associate Dean Undergraduate Student Success, College of Science

  iii. **Date:** September 22, 2023

Complete this form and submit to the [Office of Curricular Affairs](), no later than January 1 to be considered for inclusion in the following year's Academic Catalog.

    I. Requested by (College & School/Department):

College of Science/ Department of Mathematics, in collaboration with Computer Science and Molecular and Cellular Biology

    II. Proposer's name, title, email and phone number:

Bryden Cais, PhD

Professor of Mathematics

Associate Head of Undergraduate Programs
cais@math.arizona.edu

520-621-6872

    III. Degree, major and number of students currently enrolled in the major (include dual majors):

Current: B.S. in Statistics & Data Science. Requesting Name Change to: B.S. in Data Science

Current enrollment: 178 students Main campus, 69 students at CUEB

(also have 34 students in the STATDSBA/STATDSBA2 on Main campus; for now, we would like to maintain the STATDSBA as-is, until we have had more time to consider what changes are needed there)

    IV. Total number of students that have completed the major in the past 3 years:

In the last 3 academic years (2020-21, 2021-22, 2022-23), we have had 89 total students complete STATDSBS or STATDSBS2.

(For STATDSBA/STATDSBA2, there have been 19 completions.)

    V. Minimum number of units required to complete the major (do not include foundation, general education, general electives or supporting coursework):

Currently 34; increasing to 54

    VI. Name of the proposed emphases:

-Comprehensive Statistics
-Applied Statistics
-Global (for students in our existing Dual Degree Program at Capital University of Economics & Business (CUEB) in Beijing, China)
-Computing
-Molecular and Cellular Biology

    VII. When is the anticipated semester and year to launch the proposed emphasis?

Fall 2024

VIII. Campus and location offering: Please attach a completed [Add/Remove Campus form](#) to your proposal if offered via Online or Distance.

   Main (all subplans except Global); Global - CUEB (Global Subplan only)

IX. **Provide a rationale for the proposed new emphases.**

- Request from Dean of College of Science to make our existing SDS major more accessible and interdisciplinary
- Desire to better prepare students for a greater variety of post-graduation options
    - Set up one emphasis to prepare students for graduate studies in statistical data science
    - Another emphasis to prepare for jobs in statistical data science
    - A separate emphasis for students in our dual degree program at Capital University of Economics & Business in Beijing, China
    - Additional emphases in computational and biological data science
    - Flexibility to add more emphases in future
    - Inclusion of additional career preparation/exploration experiences and directed research credit in the Applied Statistics emphasis
- Changes include:
    - To better reflect the importance of computational skills in data science, the introductory computer programming course (CSC 110/ISTA 130) and the databases/SQL course (ISTA 322/CSC 460) have been moved into the core (they were previously supporting course requirements)
    - Added another computer programming course (CSC 120/ISTA 131), a lower-division statistics course (MATH 263), and an introduction to data science (DATA 201) to the core
    - Added five emphasis areas:
        - "Comprehensive Statistics" (intended for students planning to attend graduate school in statistics or statistics & data science). **This emphasis contains the existing Statistics & Data Science major, with some extra courses added: DATA 201, CSC 120/ISTA 131, MATH 263, DATA 474 (DATA 201 and DATA 474 were included in our annual curriculum updates for the STATDSBS, so we expect to add these regardless of this proposal).** As noted above, CSC 110/ISTA 130 and ISTA 322 have been upgraded from supporting requirements to core & emphasis requirements, respectively.
        - "Applied Statistics" (intended for students wanting a more statistical-focused data science major in preparation for entering the work force after graduation)
        - "Global" (for our dual degree program in China)
        - "Computing" (intended for students who want to learn more about the computational side of data science)
        - "Molecular and Cellular Biology" (intended for students who are interested in applying data science methods to biology)
    - From the existing major core, many courses have been moved into emphases:
        - MATH 223 – required in Comprehensive Statistics & Global, elective in Applied Statistics
        - DATA 363 – required in Comprehensive Statistics, Applied Statistics, Global, and Molecular & Cellular Biology. The Computing emphasis has a related course
        - DATA 375 – required in all proposed emphases
        - DATA 467 – required in Comprehensive Statistics, Applied Statistics, & Global

- DATA 474 (submitted through annual curriculum update process to be added for fall 2024) – required in Comprehensive Statistics, Applied Statistics, & Global; Computing and Molecular & Cellular Biology emphases each have a related course
- DATA 498A – required in Comprehensive Statistics, Applied Statistics, Global, & Computing; Molecular & Cellular Biology will require either this course or their own equivalent
- MATH 464 – required in Comprehensive Statistics & Global, elective in Applied Statistics
- MATH 466 – required in Comprehensive Statistics & Global

o Existing major electives are also available in the Comprehensive Statistics emphasis, with the addition of MATH 323 to serve students who need it for graduate school preparation. A selection of the existing electives plus some new options are available in the Applied Statistics emphasis

X. Requirements to meet 40% commonality across emphases.

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units needed to satisfy requirement
Calculus I	MATH 122B (4) First-Semester Calculus OR MATH 125 (3) Calculus I	3
Core	CSC 110 (4) Computer Programming I or ISTA 130 (4) Computational Thinking & Doing (Add) CSC 120 (4) Intro to Computer Prog II or (Add) ISTA 131 (4) Dealing with Data MATH 129 (3) Calculus II (Add) MATH 263 (3) Intro: Stat+Biostatistics (New) DATA 201 (3) Foundations of Data Science	17
Linear Algebra:	MATH 215 (3) Intro to Linear Algebra Or MATH 310 (3) Applied Linear Algebra Or MATH 313 (3) Intro to Linear Algebra	3
	Total major core upper division units required	0
	Total major core units required	23

Required Supporting Coursework (Not included in major units or GPA)

*Note: we DO wish to allow supporting courses to double-dip with other major requirements, as appropriate

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units needed to satisfy requirement
Lab Science Choose 2 from the following.	First Semester General Chemistry:	8

| Selections may be from different subject areas (ie, Chemistry I and Physics I) | CHEM 141 (3) Gen Chem I: Quantitative + CHEM 143 (1) Gen Chem: Quantitative Lab 1 OR CHEM 145 (1) Quantitative Chem Lab I
CHEM 151 (4) Chemical Thinking I
CHEM 161 (3) Honors Chemical Thinking I + CHEM 163 (1) Honors Fund Tech of Chem
CHEM 181 (4) Majors General Chemistry I

Second Semester General Chemistry:
CHEM 142 (3) Gen Chem II: Quantitative + CHEM 144 (1) Gen Chem: Quantitative Lab II OR CHEM 146 (1) Quantitative Chem Lab II
CHEM 152 (4) Chemical Thinking II
CHEM 162 (3) Honors Chemical Thinking II + CHEM 164 (1) Honors Fund Tech of Chem
CHEM 182 (4) Majors General Chemistry II

Geosciences
GEOS 251 (4) Physical Geology
GEOS 255 (4) Historical Geology
GEOS 302 (4) Prin Stratigraphy+Sedim
GEOS 304 (4) Structural Geology
GEOS 308 (3) Paleontology
GEOS 322 (3) Intro To Geophysics

Introductory Biology I
MCB 181R (3) Introductory Biology I + MCB 181L (1) Intro Biology I Lab
MCB 184 (4) Introductory Biology I

Introductory Biology II
ECOL 182R (3) Introductory Biology II + ECOL 182L (1) Intro Biology II Lab

Human Anatomy and Physiology
PSIO 201 (4) Human Anat+Physiology I
PSIO 202 (4) Human Anat+Physiology II

Physics I
PHYS 141 (4) Introductory Mechanics
PHYS 161H (4) Honors Intro Mechanics
PHYS 140 (3) Introductory Mechanics + PHYS 139 (1) Intro Mechanics Lab
(Add) PHYS 102 (3) Introductory Physics I + PHYS 181 (1) Introductory Laboratory I – letter included

Physics II
PHYS 142 (3) Intro Optics + Thermodyn
PHYS 162H (4) Hnrs Intr Optics+Thermod | |

	PHYS 241 (4) Intro Elec+Magnetism PHYS 261H (4) Honr Intro Electr+Magnet PHYS 240 (3) Intro Electric+Magnetism + PHYS 239 (1) Intro E&M Lab (Add) PHYS 103 (3) Introductory Physics II + PHYS 182 (1) Introductory Laboratory II – letter included Hydrology HWRS 350 (3) Principles of Hydrology (Add) Materials Science MSE 110 (4) Solid State Chemistry – letter included	
	Total Supporting Coursework upper division units required	0
	Total Supporting Coursework units required	8

XI. Requirements specific to the proposed emphases.

Comprehensive Statistics:

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units needed to satisfy requirement
Comprehensive Statistics Core	MATH 223 (4) Vector Calculus DATA/MATH 363 (3) Intro Statistical Method DATA 375 (3) Intro to Statistical Computing DATA 467 (3) Intro to Applied Linear Models (New) DATA 474 (3) Intro Stat Machine Learning DATA 498A (3) Capstone: Stats/Data Science MATH 464 (3) Theory of Probability MATH 466 (3) Theory of Statistics	25
SQL/Databases, choose one	ISTA 322 (3) Data Engineering OR (Add) CSC 460 (3) Database Design	3
Elective, choose one	MATH 323 (3) Formal Math Reasong+Wrtg DATA 367 (3) Sports Analytics DATA 396T (3) Tpcs in Undergrad Stats DATA/MATH 412 (3) Linear Algebra for Data Sc DATA/MATH 462 (3) Financial Math DATA/MATH 468 (3) Appl Stochastic Process DATA 496T (3) Advncd Tpcs in Undergrad Stats DATA 498H (3) Honors Thesis SIE 440 (3) Survey Optimization Meth	3
	Total emphasis upper division units required	27
	Total major emphasis units required*	31

*All emphases offered for this major must have the same minimum number of units required

Applied Statistics:

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units
Applied Statistics Core	DATA/MATH 363 (3) Intro Statistical Method DATA 375 (3) Intro to Statistical Computing DATA 467 (3) Intro to Applied Linear Models (New) DATA 474 (3) Intro Stat Machine Learning DATA 498A (3) Capstone: Stats/Data Science	15
(Add) Colloquia/career exploration opportunities, choose one	DATA/MATH 195M (1) Major Colloquium DATA/MATH 395M (1) Career Exploration Math & SDS DATA 391 (1) Preceptorship DATA 491 (1) Preceptorship DATA 393 (1-10) Internship DATA 493 (1-10) Internship	1
SQL/Databases, choose one	ISTA 322 (3) Data Engineering OR (Add) CSC 460 (3) Database Design	3
Electives, choose four	MATH 223 (4) Vector Calculus MATH 464 (3) Theory of Probability DATA 367 (3) Sports Analytics DATA 396T (3) Tpcs in Undergrad Stats DATA/MATH 462 (3) Financial Math DATA 496T (3) Advncd Tpcs in Undergrad Stats DATA 498H (3) Honors Thesis SIE 440 (3) Survey Optimization Meth (Add) ISTA 320 (3) Data Visualization (Add) ISTA 321 (3) Data Mining & Discovery (Add) ISTA 410 (3) Bayesian Modeling & Inference (Add) LING 439 (3) Stat Natural Lang Processing (Add) MCB 416 (3) Bioinformatics + Functional Genomic Anls (Add) MCB 447 (3) Big Data in Molecular Bio +Medicine (Add) DATA 492 (1-6 units, a maximum of 3 units may count toward this requirement) Directed Research	12
	Total emphasis upper division units required	26
	Total major emphasis units required	31

Global:

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units
Core	MATH 223 (4) Vector Calculus DATA/MATH 363 (3) Intro Statistical Method	25

	DATA 375 (3) Intro to Statistical Computing DATA 467 (3) Intro to Applied Linear Models (New) DATA 474 (3) Intro Stat Machine Learning DATA 498A (3) Capstone: Stats/Data Science MATH 464 (3) Theory of Probability MATH 466 (3) Theory of Statistics	
Thesis	DATA 499 (3) Independent Study* *Students at the CUEB campus will enroll in thesis units through their home university, and we will substitute for DATA 499.	3
SQL/Databases	ISTA 322 (3) Data Engineering	3
	Total emphasis upper division units required	27
	Total major emphasis units required	31

Computing:

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units
Computing Core	(Add) CSC 144 (3) Discrete Math for Computer Science Or (Add) MATH 243 (3) Discrete Math (Add) CSC 244 (3) Discrete Math for Computer Science II (Add) CSC 210 (4) Software Development (Add) CSC 335 (3) Object-Oriented Programming and Design (Add) CSC 345 (3) Anls of Discrete Structures (Add) CSC 380 (3) Principles of Data Science Or DATA 363 (3) Intro Statistical Method DATA 375 (3) Intro to Statistical Computing DATA 498A (3) Capstone: Stats/Data Science (Add) CSC 460 (3) Database Design (Add) CSC 480 (3) Principles Machine Learning	31
	Total emphasis upper division units required	21
	Total major emphasis units required	31

Molecular and Cellular Biology:

Requirement Title/Description	Courses (include prefix, number, title, units)	Minimum units
MCB Core	(Add) MCB 181R (3) Intro Biology I (Add) MCB 330 (1) Critical Reasoning and Problem Solving in Biomedicine DATA 363 (3) Intro Statistical Method DATA 375 (3) Intro to Statistical Computing (Add) MCB 410 (3) Cell Biology Or (Add) MCB 411 (3) Molecular Biology	25

	(Add) MCB 404 (3) Bioethics (Add) MCB 416A (3) Bioinformatics & Functional Genome Anls (Add) MCB 447 (3) Big Data in Bio & Medicine (Add) MCB 480 (3) Intro to Systems Biology Or (Add) MCB 489 (3) Foundations of Synthetic Biology	
SQL/Databases, choose one	ISTA 322 (3) Data Engineering OR (Add) CSC 460 (3) Database Design	3
Capstone	DATA 498A (3) Capstone: Stats/Data Science Or (Add) MCB 498 (3) Capstone	3
	Total emphasis upper division units required	28
	Total major emphasis units required*	31

XII. Transfer Student Considerations –

The table below shows that very few of the required courses in the existing Statistics & Data Science BS are available at Arizona community colleges. The proposed changes will increase available options for in-state community college students who plan to transfer into the major from three core courses to five core courses and 1-2 emphasis courses.

Regarding MATH 263:
- We are enthusiastic about adding this course to the major core
- This course is available at some AZ community colleges, but also available via AP credit
- It is valuable for students to take some statistics early on – it is difficult to know if a major that involves statistics & data analysis will be a good fit without having some background already; it can be taken earlier than DATA 363, which is the first statistics course in the existing major so is more accessible to everyone

Regarding MATH 223:
- Moving this course out of the core should also increase accessibility
- This course is sometimes a barrier for students, both at community colleges and at UA
- Moving it from the core to some of the emphases will allow students an opportunity to utilize it if they have already completed it

Regarding DATA 201:
- We are very excited about this course, since it will not only introduce students early to different perspectives within the field of Data Science, but also will fulfill a gen ed requirement and serve as a recruitment tool for Data Science programs
- We plan to talk with Pima Community College (perhaps others as well) about the possibility of creating an equivalent course to offer there

Lower-division courses	Existing STATDS major	Proposed DS major

Lab Science courses	Many options available at AZ community colleges (supporting requirement)	Many options available at AZ community colleges (supporting requirement)
Intro Comp Prog I (CSC 110 or ISTA 130)	CSC 110 available at AZ community colleges; ISTA 130 available at AZ Western (supporting requirement)	CSC 110 available at AZ community colleges; ISTA 130 available at AZ Western (core)
Intro Comp Prog II (CSC 120	n/a	Available at AZ community colleges (core option 1)
Dealing With Data (ISTA 131)	n/a	Available at Yavapai College (core option 2)
Calculus I (MATH 122B) & Calculus II (MATH 129)	Available at AZ community colleges (core)	Available at AZ community colleges (core)
Vector Calculus (MATH 223)	Available at AZ community colleges (core)	Available at AZ community colleges (emphasis/elective)
Intro: Stat+Biostatistics (MATH 263)	n/a	Available at some AZ community colleges (core); also available via AP exam
Intro Linear Algebra (MATH 215/313)	MATH 215 available at AZ community colleges (core)	MATH 215 available at AZ community colleges (core)
Foundations of Data Sci (DATA 201)	Not currently available (submitted via curriculum update to be added to core)	We plan to talk to PCC about the possibility of offering an equivalent (core)
Discrete Math (CSC 144 or MATH 243)	n/a	MATH 243 available at AZ community colleges (emphasis)
Discrete Math II (CSC 244)	n/a	Not currently available (emphasis)
Software Development (CSC 210)	n/a	Available at PCC (emphasis)
Intro Bio I (MCB 181R)	n/a	Available at AZ community colleges (emphasis)

Transfer students pursuing the Computing Emphasis in the BS in Data Science program may transfer a majority of the CS foundational coursework including CSC 110, CSC 120, CSC 210 and MATH 243 (currently used in lieu of CSC 144). Actual transferability of courses depends on transfer institution and articulation rules. The transferability of these courses matches our current transfer pathway for our BS in Computer Science program. Our department is considering accepting MATH 243 in lieu of CSC 144 and CSC 244 (combined). If approved, transfer students may be able to complete all foundational/lower-division CS coursework at their transfer institution. Our advising team is working closely with Pima CC advisors to connect prospective transfer students early on, in order to best advise students interested in CS. Our advising team looks forward to working with students interested in the Computing Emphasis.

XIII. **Do you want the emphasis name to appear on the transcript? ☒Yes ☐No**

XIV. **Do you want the emphasis name to appear on the diploma? ☒Yes ☐No**

XV. **Anticipated semester and year to launch the proposed emphasis:**
Fall 2024

XVI. Number of new faculty hires required to deliver the emphasis:

The Department of Mathematics was previously approved to hire two Career Track faculty positions in 2023-24 which will help cover courses under the DATA/MATH prefixes. Hiring is already in progress. We also hired two Career Track faculty in 2022-23 to cover courses for the existing Statistics & Data Science degrees.

As indicated in their letters of support, the Departments of Computer Science and Molecular and Cellular Biology intend to make adjustments to course offerings as needed to support demand. They do not expect that any new faculty hires will be necessary in the immediate future.

XVII. Budgetary impact –

The Department of Mathematics intends to transition resources from the existing Statistics & Data Science undergraduate degrees into the new Data Science degree.

The Dean of the College of Science fully supports this change, and we will rely on the college to provide financial assistance should it be needed in future to support the potential enrollment growth.

Decision process for approval will include:

1) Efficiency of course offerings
2) Course offerings are appropriate and match the expertise of the faculty.
3) Evidence of sufficient student demand
4) No major conflict with existing programs.

XVIII. Required Signatures

Managing Unit Administrator (print name and title): Bryden R. Cais, *Professor and Associate Head of Undergraduate Programs*, Department of Mathematics

Managing Administrator's Signature: Date: November 30, 2023.

Managing Unit Administrator (print name and title): Douglas Ulmer, *Professor and Head*, Department of Mathematics

Managing Administrator's Signature: Date: November 30, 2023

Dean/Assistant Dean (print name and title): Carmala Garzione, *Professor and Dean* of the College of Science

Dean's Signature: Date: November 30, 2023

For use by Curricular Affairs:

Committee	Approval date
Academic Programs Subcommittee	
Undergraduate Council	
Undergraduate College Academic Administrators Council	

☐Create approval memo

☐Send memo to college/dept and acad_org listserv

☐ Create emphasis code in UAccess, including secondary major emphasis code

☐Upload approval memo and proposal documents to UAccess

☐Notify acad_org of the plan code creation

☐Notify ADVIP team, include proposers

November 23, 2023

Bryden Cais, Professor of Mathematics and Associate Head of Undergraduate Programs
Department of Mathematics
University of Arizona
617 N. Santa Rita Ave.
P.O. Box 210089
Tucson, AZ 85721-0089 USA

Dear Dr. Cais,

This is a letter of support for the proposed Substantial Change from the existing B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed change will add emphasis tracks in several departments within the College of Science, including an emphasis in Computer Science entitled "Computing". I have reviewed the proposed degree changes, and believe that these changes are timely and will considerably enhance the breadth and depth of the educational opportunities in Data Science for students. Data Science is of increasing importance and centrality in the modern world, and is a truly interdisciplinary endeavor.

The proposed degree changes present no conflicts with programs in the Department of Computer Science, and many exciting opportunities for synergy. We are eager to welcome students from all proposed emphases of the new degree program into our relevant courses. We agree with your assessment about courses in CSC that would enrich the education of these majors. These include:

- CSC 110* [Introduction to Computer Programming I]
- CSC 120 [Introduction to Computer Programming II]
- CSC 144 [Discrete Mathematics for Computer Science I]
- CSC 244 [Discrete Mathematics for Computer Science II]
- CSC 210 [Software Development]
- CSC 335 [Object-Oriented Programming and Design]
- CSC 345 [Analysis of Discrete Structures]
- CSC 380 [Principles of Data Science]
- CSC 460 [Database Design]
- CSC 480 [Principles of Machine Learning]

Note that courses marked with an asterisk (*) were previously approved for use in the existing Statistics and Data Science degree, and we support their continued use. We will make adjustments to course offerings according to demand, and anticipate that such adjustments will require no additional faculty hires at this time but may require additional teaching assistant resources as enrollments grow.

Our department expects to provide advising for students who select our emphasis. We will negotiate with the College of Science if and when additional advising staff becomes necessary.

We look forward to future collaboration to identify possible electives that could be offered in the proposed degree.

Christian Collberg
Professor and Interim Head
Department of Computer Science

Harshbarger Building Room 220
1133 E. James E. Rogers Way
P.O. Box 210011
Tucson, AZ 85721-0011
Office 520-621-7120
Fax 520-621-1422

THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE
Hydrology &
Atmospheric Sciences

November 20, 2023

Bryden Cais
Professor of Mathematics and Associate Head of Undergraduate Programs
Department of Mathematics
University of Arizona
P.O. Box 210089
Tucson, AZ 85721-0089 USA

Dear Dr. Cais,

This is a letter of support for the proposed Substantial Change from the existing
B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed
change will add emphasis tracks in several departments within the College of Science. In
addition, the list of approved lab science courses—reflecting the science-intensive nature of a
B.S. degree—will be expanded to include additional courses in several departments across the
College of Science, including ours. I have reviewed the proposed degree changes and believe
that these changes are timely and will considerably enhance the breadth and depth of the
educational opportunities in Data Science for students. Data Science is of increasing
importance and centrality in the modern world and is a truly interdisciplinary endeavor.

The proposed degree changes present no conflicts with programs in the Department of
Hydrology & Atmospheric Sciences, and many exciting opportunities for synergy. We are eager
to welcome students from all proposed emphases of the new degree program into our relevant
courses. We agree with your assessment about courses in the Department of Hydrology &
Atmospheric Sciences that would enrich the education of these majors. These include:
- HWRS 350 [Principles of Hydrology]

Other classes that your students might be interested in may include ATMO 436a Fundamentals
of Atmospheric Sciences. We will make adjustments to course offerings according to demand,
and do not anticipate that such adjustments will require additional faculty hires or financial
resources.

We look forward to future collaboration to identify possible electives that could be offered in the
proposed degree.

Sincerely,

Christopher L. Castro
Professor and Interim Department Head

November 22, 2023

Bryden Cais, Professor of Mathematics and Associate Head of Undergraduate Programs
Department of Mathematics, University of Arizona

Dear Dr. Cais,

This is a letter of support for the proposed Substantial Change from the existing B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed change will add emphasis tracks in several departments within the College of Science. I have reviewed the proposed degree changes, and believe that these changes are timely and will considerably enhance the breadth and depth of the educational opportunities in Data Science for undergraduate students. Moving forward, I would hope to see additional tracks beyond the College of Science given that data science works across our entire university, to include CALES, iSchool, SBS, CAST, Eller, etc. Advertising the degree as an interdisciplinary degree would require inclusion from across the University and most important are the ways that incoming students perceive and also experience this opportunity.

While there are certain areas of overlap across information science and data science, we are eager to see this BS degree succeed and we welcome students from all proposed emphases of the new degree program into our relevant courses. We agree with your assessment about courses in the School of Information that would enrich the education of these majors. These include ISTA 130, 131, 320, 321, 322, and 410. We are open to including other data science courses in this degree program as needed, in nearly all of our courses we have seats available for students majoring in degree programs beyond the iSchool.

Sincerely,

Dr. Catherine Brooks
iSchool Interim Dean and Professor

THE UNIVERSITY OF ARIZONA

DEPARTMENT LINGUISTICS

College of Social & Behavioral Science
1103 E. University Blvd
PO Box 210025
Tucson AZ 85721-0025

Tel: 520-621-6897
Fax: 520-626-9017

http://linguistics.arizona.edu

November 22, 2023

Bryden Cais, Professor and Associate Head
              of Undergraduate Programs
Department of Mathematics
University of Arizona
617 N. Santa Rita Ave.
P.O. Box 210089
Tucson, AZ 85721-0089 USA

Dear Dr. Cais:

This is a letter of support for the proposed Substantial Change from the existing
B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed
change will add emphasis tracks in several departments within the College of Science. I have
reviewed the proposed degree changes, and believe that these changes are timely and will
considerably enhance the breadth and depth of the educational opportunities in Data Science for
students. Data Science is of increasing importance and centrality in the modern world, and is a
truly interdisciplinary endeavor.

The proposed degree changes present no conflicts with programs in the Department of
Linguistics, and many exciting opportunities for synergy. We are eager to welcome students
from all proposed emphases of the new degree program into our relevant courses. We agree with
your assessment about courses in the Department of Linguistics that would enrich the education
of these majors. These include:

- LING 439 [Statistical Natural Language Processing]

The above course is cross-listed as ISTA 439 and CSC 439, and we are in the process of cross-
listing it as DATA 439 as well. We will make adjustments to course offerings according to
demand, and do not anticipate that such adjustments will require additional faculty hires or
financial resources.

We look forward to future collaboration to identify possible electives that could be offered in the proposed degree.

Sincerely,

Natasha Warner
Professor and Department Head
Department of Linguistics

THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE
Molecular & Cellular Biology

Ryan Gutenkunst   Life Sciences South 325
Professor   1007 E. Lowell Street
Interim Department Head   Tucson, AZ 85721
rgutenk@arizona.edu   Tel: (520) 626-0569
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Prof. Bryden Cais   November 19, 2023
Associate Head of Undergraduate Programs
Department of Mathematics
University of Arizona

Dear Prof. Cais:

This is a letter of support for the proposed Substantial Change from the existing B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed change will add emphasis tracks in several departments within the College of Science, including an emphasis in "Molecular and Cellular Biology". I have reviewed the proposed degree changes, and I believe that these changes are timely and will considerably enhance the breadth and depth of the educational opportunities in Data Science for students. Data Science is of increasing importance and centrality in the modern world and is a truly interdisciplinary endeavor.

The proposed degree changes present no conflicts with programs in the Department of Molecular and Cellular Biology and many exciting opportunities for synergy. We are eager to welcome students from all proposed emphases of the new degree program into our relevant courses. We agree with your assessment about courses in MCB that would enrich the education of these majors. These include:

- MCB 181R [Introductory Biology I]
- MCB 181L [Introduction to Biology I Laboratory]
- MCB 330 [Critical Reasoning and Problem Solving in Biomedicine]
- MCB 404 [Bioethics]
- MCB 410 [Cell Biology]
- MCB 411 [Molecular Biology]
- MCB 416A [Bioinformatics and Functional Genomic Analysis]
- MCB 447 [Big Data in Molecular Biology and Biomedicine]
- MCB 480 [Introduction to Systems Biology]
- MCB 489 [Foundations of Synthetic Biology]
- MCB 498 [Capstone]

We will adjust course offerings according to demand, and we do not anticipate that such adjustments will require additional faculty hires or financial resources.

Our department expects to provide advising for students who select our emphasis. We will negotiate with the College of Science if and when additional advising staff becomes necessary.

We look forward to future collaboration to identify possible electives that could be offered in the proposed degree.

Sincerely,

Ryan Gutenkunst

Ryan Gutenkunst
Professor and Interim Department Head
Department of Molecular and Cellular Biology
University of Arizona

Sammy Tin
Department Head and Professor
Materials Science and Engineering
1235 E. James E. Rogers Way, Mines Bldg. 131
Tucson, AZ 85721-0012
520.626.5372 • tin@arizona.edu

Nov. 13th 2023

Bryden Cais, Professor of Mathematics and Associate Head of Undergraduate Programs
Department of Mathematics
University of Arizona
617 N. Santa Rita Ave.
P.O. Box 210089
Tucson, AZ 85721-0089 USA

Dear Dr. Cais,

This is a letter of support for the proposed Substantial Change from the existing B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed change will add emphasis tracks in several departments within the College of Science. In addition, the list of approved lab science courses—reflecting the science-intensive nature of a B.S. degree—will be expanded to include additional courses in several departments across the College of Science, including ours. I have reviewed the proposed degree changes, and believe that these changes are timely and will considerably enhance the breadth and depth of the educational opportunities in Data Science for students. Data Science is of increasing importance and centrality in the modern world, and is a truly interdisciplinary endeavor.
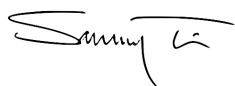
The proposed degree changes present no conflicts with programs in the Department of Materials Science & Engineering, and many exciting opportunities for synergy. We are eager to welcome students from all proposed emphases of the new degree program into our relevant courses. We agree with your assessment about courses in the Department of Materials Science & Engineering that would enrich the education of these majors. These include:
- MSE 110: Solid State Chemistry

We will make adjustments to course offerings according to demand, and do not anticipate that such adjustments will require additional faculty hires or financial resources.

We look forward to future collaboration to identify possible electives that could be offered in the proposed degree.

Sincerely,

Sammy Tin
Department Head and Patrick R. Taylor Professor
Materials Science and Engineering

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Prof. Shufang Su
Tel : 520-621-2866
E-mail : shufang@email.arizona.edu

November 12, 2023

Bryden Cais, Professor of Mathematics and Associate Head of Undergraduate Programs
Department of Mathematics
University of Arizona
617 N. Santa Rita Ave.
P.O. Box 210089
Tucson, AZ 85721-0089 USA

Dear Dr. Cais,

This is a letter of support for the proposed Substantial Change from the existing B.S. degree in Statistics and Data Science to a B.S. degree in Data Science. The proposed change will add emphasis tracks in several departments within the College of Science. In addition, the list of approved lab science courses -- reflecting the science-intensive nature of a B.S. degree -- will be expanded to include additional courses in several departments across the College of Science, including ours. I have reviewed the proposed degree changes and believe that these changes are timely and will considerably enhance the breadth and depth of the educational opportunities in Data Science for students. Data Science is of increasing importance and centrality in the modern world and is a truly interdisciplinary endeavor.

The proposed degree changes present no conflicts with programs in the Department of Physics, and many exciting opportunities for synergy. We are eager to welcome students from all proposed emphases of the new degree program into our relevant courses. We agree with your assessment about courses in the Department of Physics that would enrich the education of these majors. These include:
- PHYS 102 [Introductory Physics I] & PHYS 181 [Introductory Laboratory I]
- PHYS 103 [Introductory Physics II] & PHYS 182 [Introductory Laboratory II]
- PHYS 141* [Introductory Mechanics]
- PHYS 142* [Introductory Optics and Thermodynamics]
- PHYS 161H* [Honors Introductory Mechanics]
- PHYS 162H* [Honors Introductory Optics and Thermodynamics]
- PHYS 241* [Introductory Electricity and Magnetism]
- PHYS 261H* [Honors Introductory Electricity and Magnetism]

Note that courses marked with an asterisk (*) were previously approved for use in the existing Statistics and Data Science degree, and we support their continued use. We will make adjustments to course offerings according to demand, and do not anticipate that such adjustments

will require additional faculty hires or financial resources.

We look forward to future collaboration to identify possible electives that could be offered in the proposed degree.

Best Regards,

Shufang Su
Head, Professor of Physics
University of Arizona