



UNIVERSITY OF
MARYLAND

OFFICE OF THE PRESIDENT

Main Administration Building
College Park, Maryland 20742
301.405.5803 TEL 301.314.9560 FAX

April 7, 2021

James D. Fielder, Jr.
Secretary of Higher Education
Maryland Higher Education Commission
6 N. Liberty Street
Baltimore, MD 21201

Dear Secretary Fielder:

I am writing to request approval for a new Bachelor of Science program in Social Data Science. The proposal for the new program is attached. I am also submitting this proposal to the University System of Maryland for approval.

The proposal was endorsed by the appropriate faculty and administrative committees. I also endorse this proposal and am pleased to submit it for your approval.

Sincerely,

Darryll J. Pines
President
Glenn L. Martin Professor of Aerospace Engineering

DJP/mdc

cc: Antoinette Coleman, Associate Vice Chancellor for Academic Affairs
Ann Wylie, Senior Vice President and Provost
Gregory Ball, Dean, College of Behavioral and Social Sciences
Keith Marzullo, Dean, College of Information Studies



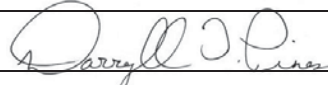
Cover Sheet for In-State Institutions

New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	University of Maryland, College Park
---------------------------------	--------------------------------------

Each action below requires a separate proposal and cover sheet.

- | | |
|---|---|
| <input checked="" type="radio"/> New Academic Program | <input type="radio"/> Substantial Change to a Degree Program |
| <input type="radio"/> New Area of Concentration | <input type="radio"/> Substantial Change to an Area of Concentration |
| <input type="radio"/> New Degree Level Approval | <input type="radio"/> Substantial Change to a Certificate Program |
| <input type="radio"/> New Stand-Alone Certificate | <input type="radio"/> Cooperative Degree Program |
| <input type="radio"/> Off Campus Program | <input type="radio"/> Offer Program at Regional Higher Education Center |

Payment <input checked="" type="radio"/> Yes	Payment <input checked="" type="radio"/> R*STARS #	Payment Amount: \$850	Date Submitted: 4/13/21
Submitted: <input type="radio"/> No	Type: <input type="radio"/> Check #		
Department Proposing Program	College of Behavioral and Social Sciences and College of Information Studies		
Degree Level and Degree Type	Bachelor's; Bachelor of Science		
Title of Proposed Program	Social Data Science		
Total Number of Credits	120		
Suggested Codes	HEGIS: 079901	CIP: 11.0401	
Program Modality	<input checked="" type="radio"/> On-campus <input type="radio"/> Distance Education (<i>fully online</i>)		
Program Resources	<input checked="" type="radio"/> Using Existing Resources <input type="radio"/> Requiring New Resources		
Projected Implementation Date	<input checked="" type="radio"/> Fall <input type="radio"/> Spring <input type="radio"/> Summer Year: 2022		
Provide Link to Most Recent Academic Catalog	URL: https://academiccatalog.umd.edu/		
Preferred Contact for this Proposal	Name: Michael Colson		
	Title: Senior Coordinator for Academic Programs		
	Phone: (301) 405-5626		
	Email: mcolson@umd.edu		
President/Chief Executive	Type Name: Darryll J. Pines		
	Signature: 		Date: 04/07/2021
	Date of Approval/Endorsement by Governing Board:		

Revised 1/2021

A. Centrality to the University's Mission and Planning Priorities

Description. Creating information products that accurately and ethically capture aspects of human behavior requires an increasingly complex set of skills and knowledge. The proposed Bachelor of Science in Social Data Science combines the expertise of faculty members from the University of Maryland's College of Information Studies (iSchool) and College of Behavioral and Social Sciences (BSOS) to prepare students to create high quality information products effectively, ethically, and efficiently. These include as data sets, visualizations, and models, about human activity, and behavior. This critical suite of knowledge and skills is essential in many domains, including government, healthcare, sustainability, economics, entertainment, human rights, equity, and others. Students take a set of core courses housed primarily in the iSchool and BSOS's Joint Program in Survey Methodology (JPSM). They then select a focused area of study that applies data science techniques along with relevant theory and methods to specific core social science disciplines, including African American Studies, Anthropology, Economics, Government and Politics/International Relations, Geography/Geospatial Information Science, Psychology, or Sociology, as well as areas particularly relevant to current societal demands such as Medical Anthropology and Public Health.

Relation to Strategic Goals. The University's mission statement includes an intent to create a climate of intellectual growth and mutual respect, that addresses policy issues critical to the state, nation, and world, that sits at the forefront of multi-disciplinary knowledge, and that improves student learning and success through expanded use of innovative teaching methods and opportunities for collaboration and engagement. More specifically, the 2016 UMD Strategic Plan Update highlights the importance of accomplishing these goals within "areas of national or global need." Data analytics, especially the process of creating and analyzing large data sets or big data, is an area of "almost desperate national need." The proposed Social Data Science program therefore falls squarely within UMD strategic priorities. As the Strategic Plan Update notes, skills in the creation of high-quality data sets, visualizations and models that capture important aspects of human behavior are required for positions across a variety of industries, including government, healthcare, sustainability, economics, entertainment, human rights, equity and diversity, and many others. With the chance to focus not solely on data science, but also on well-established social and behavioral science disciplines, the Social Data Science program will provide the basis for asking and answering sound questions of big data on human activity and behavior and using the information products they create to influence policy and industry in profound ways.

Funding. Resources for the new program will be drawn from a variety of sources, including reallocation of instructional resources from within the two colleges, support from the central university, as well as targeted funding from the state to support data science and health related areas of study. Details of the budget are presented in section L below. No new tuition revenue to support the program is assumed; it is expected that the major will draw from existing academic majors, some of which have enrollments well beyond their capacity.

Institutional Commitment. The program will be delivered by a collaboration between UMD's iSchool, which has significant expertise in the required information science, and the College of Behavioral and Social Science, which provides the disciplinary strength in the upper-level areas of focus. The Provost and President fully support the development of this program.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan

Need. In 2018, the National Academies of Sciences, Engineering, and Medicine released the report, "Envisioning the Data Science Discipline: The Undergraduate Perspective."¹ The National Academies indicated that the report was motivated by clear indications of a pervasive need to manage, analyze, and extract information from data across many industries and career sectors. The report defined data science as a complicated amalgam of disciplines and skill sets, requiring expertise in programming, statistics, ethics, and domain-specific knowledge. The report also noted that an explosion of data science careers requires a workforce with focused expertise.

State Plan. The proposed program aligns with the *Maryland State Plan for Postsecondary Education* in several ways. First, the program aligns with the state's emphasis on career training and applied research. Strategy 7 of the *Maryland State Plan* is "Enhance career advising and planning services and integrate them explicitly into academic advising and planning."² Career advising will not only be integrated with student advising but will also be incorporated in the program coursework. All core courses for the program will help students achieve this outcome.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State

The USBLS Occupational Outlook Handbook shows a projected rate of growth of 33% for individuals working in the field of Mathematics and Statistics, far higher than the average over all industries. In addition, jobs within the category of Computer and Information Technology Occupations (CITO) are projected to grow by 12%, also faster than the average. Within CITO, there is a 16% projected increase in the sub-category of Computer and Information Research Scientists, and USBLS notes that such scientists "are likely to enjoy excellent job prospects, because many companies report difficulties finding these highly skilled workers." Within Business and Financial Occupations, the career of Management Analysts (also known as Business Analysts or Process Consultants) is a potentially apt fit and projected to increase 14%. USBLS notes that "demand for the services of these workers should grow as organizations continue to seek ways to improve efficiency and control costs." Social science positions--many of which require graduate degrees--are largely holding steady or expecting a small increase (perhaps 5%), but we believe that the data science portion of this social science degree will give our graduates an edge in the job market. In addition to USBLS data, a search of "data science" in LinkedIn.com jobs generated approximately 3,500 returns in the Washington, DC, metropolitan area alone. The same search on jobs.com returned 4,000 open positions in DC and over 40,000 across the nation. These results support the National Academies recommendation to build data science undergraduate programs to prepare students for the workforce of the present and near future.

Currently, there are no similar programs in the state (see below), and consequently we expect the fast increase in demand to continue exceeding the existing supply of skilled workers, making this degree program

¹ The National Academies of Sciences, Engineering and Medicine. (2018). Envisioning the Data Science Discipline: The Undergraduate Perspective. National Academies Press. Retrieved from: <https://www.nap.edu/read/24886/chapter/1>.

² Maryland Higher Education Commission. (2017). *Maryland State Plan for Postsecondary Education*. (p. 60). Retrieved October 29, 2018 from:

<http://www.mhec.state.md.us/About/Documents/2017.2021%20Maryland%20State%20Plan%20for%20Higher%20Education.pdf>.

a crucial contributor to industry and society. We anticipate 400 students graduating per year at steady state, beginning three years after implementation of this degree.

D. Reasonableness of Program Duplication

Data Science is a rapidly developing area of study and, as such, has essentially become a “core discipline”, not unlike statistics or computer science. There are several undergraduate majors in the state of Maryland, with new proposals either under way or recently approved at USM institutions. Most have a similar core content that allows students to develop the basic skills and principles of data science, but the upper-level curricula typically diverge. Below we discuss five programs, all of which share some similarities with the program proposed here but none with the disciplinary focus of the social sciences beyond economics.

Salisbury University offers a B.S. in Data Science. The program’s core courses have content overlap with the core courses for Social Data Science, and there is a similarity in structure, in that Salisbury students select a concentration linked to a more traditional discipline. Salisbury’s program is focused on the relationship between data science and the natural sciences, with concentrations available in astrostatistics, bioinformatics, chemometrics, computational data science, geoanalytics, and mathematical data science. Mount Saint Mary’s University also offers a B.S. in Data Science, with an organizational structure similar to Salisbury’s program and with specializations in computational science, data engineering, operations research, and analytics for business. Although there are opportunities to take courses outside of the primary program they do not focus on the social sciences. Loyola University of Maryland offers a B.S. in Data Science, again with content overlap in core courses but with a focus on computer science, information systems, and mathematics. Capitol Technology University also offers a B.S. in Data Science based primarily in the field of business, with a two-pronged set of core courses, one from computer science and the other in business analytics. Finally, Goucher College offers a B.S. in Integrative Data Analytics, and it is perhaps the closest match to the proposed social data science program. Their program description draws on language similar to that in this proposal--a focus on using “scientific and mathematical principles to find nuanced, complex patterns of physical and human behavior.” However, the program allows only two concentrations: data science or economics, and the economics track is primarily at the introductory level.

We are also aware of proposals in process for new undergraduate programs in data science at the University of Maryland Global Campus (UMGC) and at Bowie State University. From the letter of intent submitted to the University System of Maryland, it appears that Bowie State University’s program will be focused on applications in the natural sciences and business. UMG’s online, open-admission program is also broadly focused on business, computer science, ethics, and machine learning and is intended to target a completely different audience.

E. Relevance to Historically Black Institutions (HBIs)

While Bowie State University’s program, assuming it will move forward to approval, will be the first data science program at one of the state’s four HBIs, the exceptionally high workforce demand for training in this area, and the rapid evolution of data science as a core competency for many disciplines, speaks to the need for as wide an avenue of opportunities for students to pursue this type of curriculum.

F. Relevance to the identity of Historically Black Institutions (HBIs)

We do not anticipate any impact on the identities of the State's HBIs.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes

Curricular Development. The core data science courses, beyond the university's General Education requirements, mostly exist and are delivered by faculty in the iSchool or from BSOS's Joint Program in Survey Methodology (JPSM). JPSM (joint with the University of Michigan) has a longstanding tradition of graduate-level education and research in applied statistics, survey methodology, and most recently in data science as it applies to social science disciplines. After completion of 9 core data science courses, and 2-3 courses of introductory material in one of eight areas of discipline focus, students will move to upper-level coursework in their disciplinary area for an additional 4-5 courses (12-15 credits), one of which is a capstone experience that requires them to apply their data science skill to their area of focus. (See Appendix B for a general layout of the proposed major and available areas of focus.)

The proposed program integrates four primary principles from the National Academies report on data science education:

- Ethics should be a key focus in data science and education.
- Data science programs should demonstrate flexibility in the concepts, skills, tools, and methods taught to provide a "full data science experience" to students.
- Data science curricula depend upon the integration of faculty from different disciplines, the utilization of varied pedagogies, and the leveraging of existing educational programs.
- Inclusion of students and faculty/staff who have historically been underrepresented in STEM careers, including data science.

As noted above, data science is a rapidly developing area of study and, as such, has essentially become a "core discipline", not unlike statistics or computer science. UMD has made data science a core educational priority for students across the campus, regardless of major. As we have seen with other core disciplines, students understand more and are able to do more when these abstract skills are learned and applied in real world contexts, such as in the social science cognate disciplines.

Faculty Oversight. As an interdisciplinary program that spans across UMD colleges, the program will be managed by one Undergraduate Program Director from the iSchool and one Undergraduate Program Director from BSOS. Directors will have faculty appointments in their respective colleges (iSchool or BSOS). The Faculty Directors will co-chair a curricular committee to provide faculty oversight of academic and pedagogical strategies, policies for student recruitment, and curricular planning for the major. They will also serve as the department-level PCC Committee for the major. Each department offering a cognate field will have a representative on the curricular committee, who will each serve as the primary point of contact for their respective cognate areas. One student will also participate as a voting member. Ex-officio members will include a representative from the Deans' offices and at least one advisor or student services representative from each College.

Appendix A contains a list of the relevant faculty who will be actively engaged in teaching the core elements of the data science courses in the curriculum, although many other faculty members will be engaged in the

major as a result of its design to connect with existing disciplinary areas of focus. The College of Behavior and Social Sciences have over 280 instructional faculty in the seven BSOS disciplines connected to the program, for example.

Educational Objectives and Learning Outcomes. The educational objectives of the program are as shown below:

Students will be able to:

- Design, execute, document, and disseminate research that applies tools and methods from data science to address a social science research question;
- Develop expertise in specific contemporary social science theories and data science approaches to tackling research questions related to these theories;
- Apply findings from social data science research to analyze the policy and design of socio-technical systems; and
- Identify and analyze social, legal, and ethical and equity issues in social data science work and in the profession.

The iSchool will lead the assessment process for the program, in collaboration with the BSOS cognate departments. The result will be an annual learning outcomes assessment that is consistent with the expectations of the Provost's Commission on Learning Outcomes Assessment.

The iSchool will work with the cognate departments to develop a set of rubrics that individual faculty members will apply to work completed in their courses. There will be a rubric for each learning outcome, and all faculty members teaching in core courses will select an individual assignment to assess using the appropriate rubric(s). The items assessed will be direct measures of student learning and may include sections of exams, homework assignments, laboratory assignments, and final projects.

Institutional assessment and documentation of learning outcomes. Undergraduate programs complete annual assessments, with each learning outcome evaluated at least once in a four-year cycle. Programs report findings each fall in summary form following a template structure and are informed by a "best practices" guide and a rubric. Assessment summary reports for each college are collected by the College Coordinator, who works to promote high standards through support and guidance to programs and with continuous improvement practices.

Student Learning Outcomes are evaluated through course-specific performance indicators. The program will establish rubrics for each performance indicator and develop a course-related assessment as part of this evaluation. Faculty members will then be asked to evaluate the students through these course assessments. Assessment of learning outcomes will take place each year.

Course requirements. The Social Data Science program includes 57-59 credits of required courses (including courses that also count for General Education).

Course Requirements		
Core Courses		
Course Code	Title	Credits
INST126 Or GEOG276	Introduction to Programming for Information Science Principles of Python Programming and Geocomputing	3
STAT100	Elementary Statistics and Probability	3
MATH115 Or MATH120	Precalculus Elementary Calculus I	3
BSOS233	Data Science for Social Sciences	3
INST326 Or BSOS326 Or GEOG376	Object-Oriented Programming for Information Science Python Programming for the Social Sciences Introduction to Computer Programming for GIS	3
INST327	Database Design and Modeling	3
INST366	Privacy, Security and Ethics for Big Data	3
INST414	Data Science Techniques	3
INST447	Data Sources and Manipulation	3
INST462	Introduction to Data Visualization	3
SURV400	Fundamentals of Survey and Data Science	3
SURV430	Fundamentals of Questionnaire Design	3
INST492	Integrated Capstone for Social Data Science	3
Cognate (Students Choose One Cognate and Take Courses Specific to that Discipline)		
	African American Studies Cognate	18
	Anthropology Cognate	18
	Economics Cognate	18
	Geographical Sciences Cognate	18
	Government and Politics Cognate	18
	Psychology Cognate	19
	Sociology Cognate	20
	Health Analytics	20

See Appendix C for course descriptions for those courses offered by the two departments that will deliver the major. All other course descriptions are available in the University's Undergraduate Catalog (<https://courseleaf.umd.edu/undergraduate/>).

General Education. Students will complete some of their general education requirements by way of fulfilling major requirements, with space in the curriculum for all other General Education requirements. Students who transfer to UMD with an associate degree from a Maryland community college are deemed to have completed their General Education requirements except for Professional Writing, which is typically taken in their third year of study. See Appendix D for a sample plan for how students would complete the program and fulfill their General Education Requirements.

Accreditation or Certification Requirements.

N/A

Other Institutions or Organizations. The department does not currently intend to contract with another institution or non-collegiate organization for this program.

Student Support. Students enrolled in this program will have access to all the resources necessary to succeed in the program and make the most of the learning opportunity. Students entering the university as either first-time college students or transfer students will learn about the program through their orientation program. Students entering the major as internal transfers will meet with an advisor in the program when they declare the major. Existing administrative and advising resources will be used. However, one new undergraduate advisor in the iSchool and one new undergraduate advisor in the BSOS College will support the social data science major. This is important so that the two colleges can work closely together to ensure that advising is closely aligned and that students are fully supported, even as they spread across two colleges and multiple departments.

Marketing and Admissions Information. The program will be clearly and accurately described in the university website and be marketed at university recruiting events.

H. Adequacy of Articulation

Montgomery College is typically the largest feeder of transfer students to the university on the College Park campus. As the program develops, outreach will continue with other local community colleges in, for example, Frederick and Prince Georges County. Students who complete the associate degree at a Maryland Community College and transfer to the University of Maryland are deemed to have completed their general education requirements, except for Professional Writing. The University does not, typically, create specific articulation agreements with community colleges for programs based in the liberal arts & sciences such as this one.

I. Adequacy of Faculty Resources

Program faculty. Appendix A contains a list of the relevant faculty who will be actively engaged in teaching the core elements of the data science courses in the curriculum, although many other faculty members will be engaged in the major because of its design to connect with existing disciplinary areas of focus. The College of Behavior and Social Sciences have over 280 instructional faculty in the seven BSOS disciplines connected to the program, for example.

Faculty training. Faculty teaching in this program will have access to instructional development opportunities available across the College Park campus, including those offered as part of the Teaching and Learning Transformation Center. For online elements of the coursework, instructors will work with the learning design specialists on campus to incorporate best practices when teaching in the online environment.

J. Adequacy of Library Resources

The University of Maryland Libraries has assessed library resources required for this program. The assessment concluded that the University Libraries can meet, with its current resources, the curricular and research needs of the program.

K. Adequacy of Physical Facilities, Infrastructure, and Instructional Resources

No additional facilities are needed to deliver the program: most courses will be taught in any of the University's 334 general purpose classrooms.

L. Adequacy of Financial Resources

Resources for the program will come primarily from multiple sources as the program develops. For the health-related tracks, specific budget restoration funding has been provided in the FY22 Governor's budget. Other portions of the program will be funded through a mix of reallocation of college resources and the University's tuition revenue. No new tuition revenue is assumed. The design of the program is such that new cognate areas can be launched as resources become identified. Priority areas at initial startup will be within those units that have capacity to add students, as well as those related to aspects of health. These include Anthropology, African American Studies, Sociology, and Health Analytics. Other cognates will be added as the program develops.

Resources:

1. Reallocated Funds: The University anticipates that some additional startup costs will be incurred until a full cohort of students is enrolled in the program. Reallocated resources will come from a redirection of effort from within the Colleges and general university funds.
2. Tuition revenue: The University does not anticipate an overall increase in enrollment, and thus no new additional tuition revenue is projected for those students.
3. Grants, Contracts and External Sources: none
4. Other Sources: The governor's FY22 supplemental budget allocated \$1.5M to increase support for this program. In FY22 these funds will be used for curriculum development and planning, and in subsequent years to execute delivery.

Expenditures:

1. Most courses are already available faculty across the engaged colleges. Additional instructional FTE will be required to staff new sections of courses beginning in FY23, which is year 1 of program delivery.
2. Approximately 3.0 FTE of administrative support will be assigned to assist with program management, student advising, and class coordination once the program is in full operation.
3. Approximately 1.0 FTE of staff support will be technical support for system software administration and data management.
4. Teaching assistants will be allocated for the program each semester to assist with classroom instruction/discussion.
5. Equipment funding includes computing needs and hourly undergraduate student employees.
6. No new library resources are required for the program, but expenses include software licenses and annual cloud storage fees.
7. Renovations to or reallocation of space is not required.

8. Operational expenses include tuition remission for graduate teaching assistants.

M. Adequacy of Program Evaluation

Formal program review is carried out according to the University of Maryland's policy for Periodic Review of Academic Units, which includes a review of the academic programs offered by, and the research and administration of, the academic unit (<http://www.president.umd.edu/policies/2014-i-600a.html>). Program Review is also monitored following the guidelines of the campus-wide cycle of Learning Outcomes Assessment (<https://www.irpa.umd.edu/Assessment/LOA.html>). Faculty within the department are reviewed according to the University's Policy on Periodic Evaluation of Faculty Performance (<http://www.president.umd.edu/policies/2014-ii-120a.html>). Since 2005, the University has used an online course evaluation instrument that standardizes course evaluations across campus. The course evaluation has standard, university-wide questions and allows for supplemental, specialized questions from the academic unit offering the course.

N. Consistency with Minority Student Achievement goals

The student populations in the colleges engaged in this new major are among the most diverse at the university, with percentages of URM students five to 10 percentage points above that of the overall undergraduate student population. More generally, diversity, equity, and inclusion (DEI) sit at the core of the values of the engaged colleges. Educators and scholars in these units serve as powerful thought leaders in anti-racism scholarship, health disparities, and racial inequities in access to technology and information. The program is grounded in the importance of applying DEI principles across the curriculum.

O. Relationship to Low Productivity Programs Identified by the Commission

N/A

P. Adequacy of Distance Education Programs

N/A

Tables 1 and 2: Resources and Expenditures

Tuition revenue is based on AY2020-21 rates for the University. It does not include mandatory fees or laboratory fees. The University is not anticipating overall enrollment growth on the College Park campus because of this new major, so no new tuition revenue is included for the on-campus delivery. Note that “year 1” of the budget tables corresponds to fiscal year 2023 (Fall 2022). FY22 will be used to continue with curriculum development and initiate staffing for program delivery.

TABLE 1: RESOURCES	FY23	FY24	FY25	FY26	FY27
Resources Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	\$50,000	\$200,000	\$500,000	\$500,000	\$500,000
2. Tuition/Fee Revenue (c+g below)	\$0	\$0	\$0	\$0	\$0
a. #FT Students	50	100	400	800	1,200
b. Annual Tuition/Fee Rate	\$14,046	\$14,468	\$14,902	\$15,349	\$15,809
c. Annual FT Revenue (a x b)	\$0	\$0	\$0	\$0	\$0
d. # PT Students	0	0	0	0	0
e. Credit Hour Rate	\$475.90	\$490.18	\$504.88	\$520.03	\$535.63
f. Annual Credit Hours	14	14	14	14	14
g. Total Part Time Revenue (d x e x f)	\$0	\$0	\$0	\$0	\$0
3. Grants, Contracts, & Other External Sources	\$0	\$0	\$0	\$0	\$0
4. Other Sources	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000
TOTAL (Add 1 - 4)	\$1,550,000	\$1,700,000	\$2,000,000	\$2,000,000	\$2,000,000

TABLE 2: EXPENDITURES

	FY23	FY24	FY25	FY26	FY27
Expenditure Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. TTK Faculty (b+c below)	\$410,970	\$423,299	\$435,998	\$449,078	\$449,078
a. #FTE	2.0	2.0	2.0	2.00	2.00
b. Total Salary	\$309,000	\$318,270	\$327,818	\$337,653	\$337,653
c. Total Benefits	\$101,970	\$105,029	\$108,180	\$111,425	\$111,425
1. PTK Faculty (b+c below)	\$532,000	\$547,960	\$846,598	\$871,996	\$871,996
a. #FTE	4.0	4.0	6.0	6.0	6.0
b. Total Salary	\$400,000	\$412,000	\$636,540	\$655,636	\$655,636
c. Total Benefits	\$132,000	\$135,960	\$210,058	\$216,360	\$216,360
2. Graduate Teaching Assistants (b+c below)	\$95,760	\$98,633	\$203,184	\$209,279	\$209,279
a. #FTE	4.0	4.0	8.0	8.0	8.0
b. Total Salary	\$72,000	\$74,160	\$152,770	\$157,353	\$157,353
c. Total Benefits	\$23,760	\$24,473	\$50,414	\$51,926	\$51,926
3. Admin. Staff (b+c below)	\$279,300	\$287,679	\$296,309	\$305,199	\$305,199
a. #FTE	3.0	3.0	3.0	3.0	3.0
b. Total Salary	\$210,000	\$216,300	\$222,789	\$229,473	\$229,473
c. Total Benefits	\$69,300	\$71,379	\$73,520	\$75,726	\$75,726
4. Total Support Staff (b+c below)	\$99,750	\$102,743	\$105,825	\$109,000	\$109,000
a. #FTE	1.0	1.0	1.0	1.0	1.0
b. Total Salary	\$75,000	\$77,250	\$79,568	\$81,955	\$81,955
c. Total Benefits	\$24,750	\$25,493	\$26,257	\$27,045	\$27,045
5. Equipment	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
6. AWS, Software, Licenses & Library	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000
7. New or Renovated Space	\$0	\$100,000	\$0	\$0	\$0
8. Other Expenses: Operational	\$103,536	\$103,536	\$207,072	\$310,608	\$310,608
TOTAL (Add 1 - 7)	\$1,596,316	\$1,738,849	\$2,169,986	\$2,330,159	\$2,330,159

Notes: Graduate assistants are included in the budget to support instruction, and other expenses include tuition remission for graduate teaching assistants. "Equipment" includes hourly wages for undergraduate student employees.

Appendix A: Faculty who will support the Social Data Science Program

All faculty hold doctoral degrees in a field relevant to the discipline. Faculty biographies and research interests for all faculty can be found on the department web sites of the engaged colleges (Behavioral and Social Sciences: <https://bsos.umd.edu/faculty-staff/faculty-profiles> ; iSchool: <https://www.ischool.umd.edu/about> ; Public Health: <https://sph.umd.edu/faculty>). All faculty listed below are full-time. Specific course assignments have not yet been made but will be made in time to schedule the courses for the target start term of the program. Additional hires are anticipated to support the program as it develops.

Faculty Name	Highest Degree Earned - Field and Institution	Rank
Dr. Brian Kim	PhD in Statistics, University of California Los Angeles	Assistant Research Professor, JPSM
Dr. Frauke Kreuter	PhD in Sociology, University of Konstanz, Germany	Professor, JPSM; Director of Social Data Science Center (SODA)
Dr. Partha Lahiri	PhD in Statistics, University of Florida	Professor, Mathematics and JPSM, Director of JPSM
Dr. Taylor Oshan	PhD in Geography, Arizona State University	Assistant Professor, Geographical Sciences
Dr. Wei Ai	PhD in Information, University of Michigan	Assistant Professor, iSchool
Dr. Chris Antoun	PhD in Survey Methodology, University of Michigan	Assistant Research Professor, iSchool and JPSM
Dr. Vedat Diker	PhD in Information Science, SUNY Albany	Principal Lecturer, iSchool
Dr. Niklas Elmqvist	PhD in Computer Science, Chalmers University of Technology	Professor, iSchool
Dr. Babak Fotouhi	PhD in Electrical Engineering, McGill University	Assistant Professor, iSchool
Dr. Vanessa Frias-Martinez	PhD in Computer Science, Columbia University	Associate Professor, iSchool
Dr. Jen Golbeck	PhD in Computer Science, University of Maryland	Professor, iSchool; Affiliate Faculty, Journalism and Computer Science
Dr. Naeemul Hassan	PhD in Computer Science, University of Texas, Arlington	Assistant Professor, iSchool and Journalism; Director, Computational Journalism Lab
Dr. Jessica Vitak	PhD in Media and Information, Michigan State University	Associate Professor, iSchool; Affiliate Faculty, Communications

Appendix B: Diagrammatic Structure of the Social Data Science Major

Social Science Cognate Area (pick one)	<i>African American Studies</i>	<i>Anthropology</i>	<i>Economics*</i>	<i>Geographical Sciences & GIS</i>	<i>Government & Politics & Intl. Rel.*</i>	<i>Psychology</i>	<i>Sociology</i>	<i>Public Health Science</i>
Benchmark I Minimum MATH & STAT (6 cr)	STAT100 (3) & MATH115 (3)	STAT100 (3) & MATH115 (3)	STAT100 (3) & MATH120 (3)	STAT100 (3) & MATH120 (3)	STAT100 (3) & MATH115 (3)	STAT100 (3) & MATH120 (3)	STAT100 (3) & MATH115(3)	STAT100 (3) & MATH120 (3)
Benchmark I (3 cr)	INST126 (3) or GEOG276 (3)							
Benchmark II (6-9 cr)	AASP101 (3) AASP210 (3)	ANTH210 (3) or 222 (4) or 240 (3)* INST314 (3)	ECON200 (3) ECON201 (3) ECON230 (3)	GEOG202 (3) GEOG306 (3)	GVPT1170 (3) GVPT200 (3) GVPT201 (3)	PSYC100 (3) PSYC200 (3)	SOCY100 (3) SOCY201 (3)	SPHL100 (3) EPIB301 EPIB315
Core Courses (27 cr)	BSOS233 (3) INST326 (3) or BSOS326(3) or GEOG376 (3) INST327 (3) and INST366 (3) INST414 (3) and INST447 (3) INST462 (3) SURV400 (3) and SURV430 (3)							
Capstone (3 cr)	INST492 (3)							
Cognate I Courses (3 cr)	Required 3 cr AASP395 (3)	Required 3 cr ANTH310 or 322 or 340*	Required 3 cr ECON305 or 306	Required 3 cr GEOG373	Required 3 cr GVPT320	Required 3 cr PSYC300	Required 3 cr SOCY202	Required 3 cr HLTH200
Cognate II Courses (6-9 cr)	choose 9 cr. from list	choose 9 cr. from list	choose 6 cr. from list	choose 9 cr. from list	choose 6 cr. from list	choose 9 cr. from list	choose 9 cr. from list	choose 9 cr. from list

*It is possible that not all tracks will be started at the same time. The ECON and GVPT tracks may be delayed until after the major is up and running.

Appendix C: Course Descriptions for the core courses of the Social Data Science major

Courses in this list represent the core curriculum required of all students, beyond their Fundamental Studies general education requirements. Most courses are already approved and have been offered. A very large number of offerings are available among the cognates. All approved course descriptions can also be found in the University's Undergraduate Catalog (<https://courseleaf.umd.edu/undergraduate/approved-courses/>).

INST126 Introduction to Programming for Information Science (3 Credits)

An introduction to computer programming for students with very limited or no previous programming experience. Topics include fundamental programming concepts such as variables, data types, assignments, arrays, conditionals, loops, functions, and I/O operations.

Prerequisite: Minimum grade of C- in **MATH115**; or must have math eligibility of **MATH140** or higher; or permission of instructor.

Restriction: Must not have completed **INST326**; and must be in Information Science program.

INST326 Object-Oriented Programming for Information Science (3 Credits)

An introduction to programming, emphasizing understanding and implementation of applications using object-oriented techniques. Topics to be covered include program design and testing as well as implementation of programs.

Prerequisite: Minimum grade of C- in **INST126**.

INST327 Database Design and Modeling (3 Credits)

Introduction to databases, the relational model, entity-relationship diagrams, user-oriented database design and normalization, and Structured Query Language (SQL). Through labs, tests, and a project, students develop both theoretical and practical knowledge of relational database systems.

Prerequisite: Minimum grade of C- in **INST126**.

Credit Only Granted for: **INST327** or **BMGT402**.

INST366 Privacy, Security and Ethics for Big Data (3 Credits)

Evaluates major privacy and security questions raised by big data, Internet of things (IoT), wearables, ubiquitous sensing, social sharing platforms, and other AI-driven systems. Covers history of research ethics and considers how ethical frameworks can and should be applied to digital data.

Prerequisite: **INST201** or **INST301**; or permission of instructor.

INST414 Data Science Techniques (3 Credits)

An exploration of how to extract insights from large-scale datasets. The course will cover the complete analytical funnel from data extraction and cleaning to data analysis and insights interpretation and visualization. The data analysis component will focus on techniques in both supervised and unsupervised learning to extract information from datasets. Topics will include clustering, classification, and regression techniques. Through homework assignments, a project, exams and in-class activities, students will practice working with these techniques and tools to extract relevant information from structured and unstructured data.

Prerequisite: 1 course with a minimum grade of C- from (**INST201**, **INST301**); and minimum grade of C- in **INST126**, **INST314**, **STAT100**, **MATH115**, and **PSYC100**.

INST447 Data Sources and Manipulation (3 Credits)

Examines approaches to locating, acquiring, manipulating, and disseminating data. Imperfection, biases, and other problems in data are examined, and methods for identifying and correcting such problems are introduced. The course covers other topics such as automated collection of large data sets, and extracting, transforming, and reformatting a variety of data and file types.

Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST327, STAT100, MATH115, and PSYC100; and 1 course with a minimum grade of C- from (INST326, CMSC131).

INST462 Introduction to Data Visualization (3 Credits)

Exploration of the theories, methods, and techniques of visualization of information, including the effects of human perception, the aesthetics of information design, the mechanics of visual display, and the semiotics of iconography.

Prerequisite: 1 course with a minimum grade of C- from (INST201, INST301); and minimum grade of C- in INST126, INST314, MATH115, PSYC100, and STAT100.

INST492 Integrated Capstone for Social Data Science (3 Credits)

The capstone provides a platform for Social Data Science students where they can apply a subset of the concepts, methods, and tools they learn as part of the Social Data Science program to addressing an information problem or fulfilling an information need. (NEW)

Prerequisite: A minimum grade of C- in BSOS233, INST366, INST414, INST447, INST462, SURV400, SURV430; a minimum grade of C- from (INST326, BSOS326, GEOG276)

SURV400 Fundamentals of Survey and Data Science (3 Credits)

The course introduces the student to a set of principles of survey and data science that are the basis of standard practices in these fields. The course exposes the student to key terminology and concepts of collecting and analyzing data from surveys and other data sources to gain insights and to test hypotheses about the nature of human and social behavior and interaction. It will also present a framework that will allow the student to evaluate the influence of different error sources on the quality of data.

Prerequisite: STAT100; or permission of BSOS-Joint Program in Survey Methodology department.

Restriction: Course open to SURV certificate students, SURV Advanced Special Students, and SURV undergraduate minors. Graduate students from other departments may enroll with permission from the department.

Credit Only Granted for: SURV699M or SURV400.

SURV430 Fundamentals of Questionnaire Design (3 Credits)

Introduction to the scientific literature on the design, testing and evaluation of survey questionnaires, together with hands-on application of the methods discussed in class.

Restriction: Permission of BSOS-Joint Program in Survey Methodology department.

Credit Only Granted for: SURV430 or SURV630.

BSOS233 Data Science for Social Sciences (3 Credits)

An introduction to modern methods of data analysis for social scientists. This course emphasizes teaching students who have no previous coding experience how to analyze data and extract meaning in a social

science context. Students will gain critical programming skills and learn inferential thinking through examples and projects with real-world relevance. (NEW)

BSOS326: Python Programming for the Social Sciences (3 Credits)

Python has become the most powerful programming language in advanced statistics and data analytics. It includes expansive packages for data handling and processing, including the latest developments in machine learning, and offers Integrated Development Environments (IDE) for code development, testing, debugging, and graphical representation. In addition, python is deployed on virtually all high-performance computing clusters, taking advantage of multi-processing, large memory, and GPU enhanced computing environments. This course offers a thorough introduction to python and those packages that are fundamental to data processing and analysis, image processing, natural language processing, machine learning. (NEW)

GEOG376 Programming for Geographic Analysis (3 Credits)

Covers conceptual and practical aspects of geospatial data modeling and analysis techniques using the Python programming language. The main focus is on developing a solid understanding of the programmatic conventions needed to create, manipulate, and process geospatial data types, such as point, line, & polygon vectors, networks, trajectories, and space-time extensions. In addition, students will develop a proficiency in applying these data structures to perform automated geospatial analysis, such as GIS operations, agent-based models, Markov models, and spatial statistics.

Prerequisite: Must have completed or be concurrently enrolled in [MATH120](#), [MATH130](#), or [MATH140](#); or must have completed MATH220. And [GEOG373](#); or permission of BSOS-Geography department.

Appendix D: Sample Four Year Plan for Social Data Science Major

Fall			Spring		
Year 1					
ENGL101 (FSAW)	Academic Writing	3	STAT100 (FSAR)	Elementary Statistics and Probability	3
MATH115 (FSMA) Or MATH130	Pre-Calculus or Calculus I	3	INST126 (Core)	Introduction to Programming for Information Science	3
Cognate Course (DSHS) (Cognate)	Cognate Introductory Course	3	Gen Ed (DSHS) (SCIS)		3
Gen Ed (DSHU)		3	Gen Ed (FSOC)	Oral Communication	3
Elective		3	Gen Ed (DVUP)		3
	Total credits	15		Total Credits	15
Year 2					
BSOS233 (Core)	Data Science for Social Sciences	3	INST326 (Core)	Object-Oriented Programming for Information Science	3
Cognate Course	(Cognate)	3	Cognate Course	(Cognate)	3
Gen Ed (DSNL)		4	Gen Ed (DVCC)		3
Gen Ed (SCIS)		3	Elective		3
Gen Ed (DSHU)		3	Elective		3
	Total Credits	16		Total Credits	15
Year 3					
Cognate Course	(Cognate)	3	Cognate Course	(Cognate)	3
INST327 (Core)	Database Design and Modeling	3	INST447 (Core)	Data Sources and Manipulation	3
INST414 (Core)	Data Science Techniques	3	INST462 (Core)	Introduction to Data Visualization	3
Gen Ed (DSNS)		3	ENGL39X (FSPW)	Professional Writing	3
Elective		3	Gen Ed (DSSP)		3
	Total Credits	15		Total Credits	15
Year 4					
Cognate Course	(Cognate)	3	INST492 (Core) (DSSP)	Integrated Capstone for Social Data Science	3
INST366 (Core)	Privacy, Security and Ethics for Big Data	3	SURV430 (Core)	Questionnaire Design	3
SURV400 (Core)	Fundamentals of Survey and Data Science	3	Electives		8
Electives		6			
	Total Credits	15		Total Credits	14
Total Credits: 120					

Category	Credits	Code
Major Requirements: 30 Credits		
Major Core Courses	39	Core
Major Cognate Courses	18-20	Cognate
Major courses may double-count to fulfill General Education requirements (see below).		
General Education Requirements: 40 Credits Minimum		
Fundamental Studies: 15 Credits		
Fundamental Studies Academic Writing	3	FSAW
Fundamental Studies Professional Writing	3	FSPW
Fundamental Studies Oral Communication	3	FSOC
Fundamental Studies Mathematics	3	FSMA
Fundamental Studies Analytic Reasoning ²	3	FSAR
² If a student passes an Analytic Reasoning course that requires a Fundamental Studies Math course as a prerequisite, then the Fundamental Studies Math course is considered to be fulfilled (e.g., students who place into and pass a calculus course, which counts for FSAR, do not need to take a less advanced Math course to fulfill the FSMA requirement).		
Distributive Studies: 25 Credits		
Distributive Studies Natural Sciences	3	DSNS
Distributive Studies Natural Science Lab Course ³	4	DSNL
Distributive Studies History and Social Sciences	6	DSHS
Distributive Studies Humanities	6	DSHU
Distributive Studies Scholarship in Practice ⁴	6	DSSP
³ A second DSNL course can fulfill the DSNS course requirement.		
⁴ Students learn and practice skills of critical evaluation and participate in the process of applying knowledge in the pursuit of a tangible goal. At least one course must be outside of the major.		
I-Series Courses: 6 Credits⁵		
The signature courses of the UMD General Education program, I-Series courses investigate a significant issue in depth and demonstrate how particular disciplines and fields of study address problems.		
I-Series Course	6	SCIS
⁵ I-Series credits may be double-counted with courses taken for the Distributive Studies requirement.		
Diversity: 4-6 Credits⁶		
Diversity Understanding Plural Societies ⁷		
Courses examine how diverse cultural and ethnic groups co-exist.	3-6	DVUP
Diversity Cultural Competence		
Courses help students develop skills to succeed in a diverse world.	0-3	DVCC
⁶ These credits may be double-counted with courses taken for the Distributive Studies requirement.		
⁷ Students may take either two DVUP courses or one DVUP course and one DVCC course.		

