FAU
BOARD OF TRUSTEES
Florida Atlantic University

Item: AS: A-1

Tuesday, June 2, 2020

SUBJECT: REQUEST FOR APPROVAL OF A NEW DEGREE PROGRAM - CIP 30.0601

PROPOSED BOARD ACTION

Approval of the following New Degree Program – CIP 30.0601:

- Bachelor of Science in Data Science and Analytics

BACKGROUND INFORMATION

The proposed program is a Bachelor of Science in Data Science and Analytics (BSDSA). The program will be multi-college, interdisciplinary program, jointly administered by the Charles E. Schmidt College of Science, the College of Engineering & Computer Science, the College of Business, Dorothy F. Schmidt College of Arts and Letters, and the School of Criminal Justice at Florida Atlantic University (FAU). The program will have four concentrations, Data Science in the Natural Sciences, Data Science and Engineering, Data Science in Business, and Data Science and Society.

The proposed program contains a broad 18-credit common core which includes courses that develop skills in mathematical, statistical, and computer science foundations and also in experimental design and data management with excel, as well as a course that explores the social implications of the use of big data and artificial intelligence methods. After the common core, students pursue 21 credits in specialized concentrations, take 6 credits of electives from across the concentrations as well as applied courses in other disciplines, and a common 3-credit capstone experience. This will provide students with opportunities to acquire data-related skills across disciplines, including both hard skills in mathematics, statistics, and computer science, and also skills from business and information technology management as well as the natural and social sciences, to meet the needs for data scientists and data skills in industry, business, and government. The 120-credit program has 48 credits of major requirements, 36 credits in Intellectual Foundations, and 36 unrestricted electives.

IMPLEMENTATION PLAN/DATE

Effective Fall 2020, pending approval by the Florida Atlantic University Board of Trustees.

FISCAL IMPLICATIONS

No programs will be significantly impacted by the reallocation of resources. The colleges and departments participating in the proposed degree have already developed elective courses

and certificate programs to serve increased student interest in data science and analytics. This has already precipitated a shift in faculty effort and instructional resources to this area.

Supporting Documentation: New Degree Proposal Form
Presented by: Dr. Bret Danilowicz, Vice President for Academic Affairs & Provost
Phone: 561-297-6350

Board of Governors, State University System of Florida
Request to Offer a New Degree Program

(Please do not revise this proposal format without prior approval from Board staff)

Florida Atlantic University	**Fall 2020**
University Submitting Proposal	**Proposed Implementation Term**
Science, Engineering & Computer Science, Business, Arts & Letters, Design and Social Inquiry	**Math/CEECS/ITOM/Political Science/Criminology and Criminal Justice**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Data Science and Analytics	**BS in Data Science and Analytics**
Academic Specialty or Field	**Complete Name of Degree**
30.0601	
Proposed CIP Code	

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees		**President**	**Date**
Signature of Chair, Board of Trustees	**Date**	**Vice President for Academic Affairs**	**Date**

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1 in Appendix A. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2 in Appendix A. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	30	23	$16,978	$390,503	$0	$0	$390,503
Year 2	40	30					
Year 3	50	38					
Year 4	60	45					
Year 5	70	53	$16,409	$869,655	$0	$0	$869,655

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed. Tables 1 through 4 are to be included as Appendix A and not reproduced within the body of the proposals because this often causes errors in the automatic calculations.

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including majors, concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

The proposed degree is a Bachelor of Science in Data Science and Analytics (BS-DSA). This is a multi-college, interdisciplinary program, jointly administered by the Charles E. Schmidt College of Science, the College of Engineering & Computer Science, the College of Business, the Dorothy F. Schmidt College of Arts & Letters, and the College of Design and Social Inquiry. It is designed to provide students with interests in Data Science and Data Analytics a unique and multifaceted educational opportunity within and across each of its areas of concentration. The program will have four concentrations, Data Science in the Natural Sciences, Data Science and Engineering, Data Science in Business, and Data Science and Society. As described in Section III.C., the Colleges of Science, Engineering, and Business have already developed elective courses in data science and analytics. However, the Colleges of Arts and Letters and Design and Social Inquiry are still in the process of developing such courses, and as a result, the Data Science and Society concentration will begin in Year 2. The Colleges of Arts and Letters and Design and Social Inquiry will participate in Year 1 by offering a core course and some free electives, and a broad outline of the concentration will be described in Section VIII.C.

The proposed program contains a broad 18-credit common core which includes courses that develop skills in mathematical, statistical, and computer science foundations and also in experimental design and data management with excel, as well as a course that explores the social implications of the use of big data and artificial intelligence methods. After the common core, students pursue 21 credits in specialized concentrations, take 6 credits of electives from across the concentrations as well as applied courses in other disciplines, and a common 3-credit capstone experience. This will provide students with opportunities to acquire data-related skills across disciplines, including both hard skills in mathematics, statistics, and computer science, and also skills from business and information technology management as well as the natural and social sciences, to meet the needs for data scientists and data skills in industry, business, and government. The 120-credit program has 48 credits of major requirements, 36 credits in Intellectual Foundations, and 36 unrestricted electives.

Graduates will be well-prepared to enter the high demand workforce in the era of big data and quantum information processing. Potential jobs include data scientist, data analyst, survey statistician, research analyst, data security analyst, quantitative social scientist, computational linguist, data product developer, marketing analyst, and many more. The market analysis report (January 2020) by Hanover Research (Appendix L), contracted by FAU for this degree program, shows a high level of employment opportunities in the areas of professional services, finance, and insurance, but also the fastest growing skills required for jobs in data science fields are data management, machine learning, big data, and data visualization.

B. Please provide the date when the pre-proposal was presented to CAVP (Council of

Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The pre-proposal for the Bachelor of Science in Data Science and Analytics was presented to the CAVP Curriculum Working Group on September 25, 2019. The comments from SUS members and the BOG staff were highly positive with no concerns. The only suggestion that came up was the breadth of our proposed degree program may benefit from consultation with potential external employers (advisory group) to help shape the curriculum within the areas of specialization.

FAU faculty have strong connections with local industry and businesses through an annual Data Science and Analytics Conference as well as other conferences and partnerships. The steering committee for the development of this degree will recruit an advisory board to help ensure that the program is delivering the appropriate skill sets and to potentially enhance the capstone experience with projects and experiences from business, industry, and government. See Section VIII.F.

C. If this is a doctoral level program please include the external consultant's report at the end of the proposal as Appendix D. Please provide a few highlights from the report and describe ways in which the report affected the approval process at the university.

Not Applicable.

D. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which specific goals the program will directly support and which goals the program will indirectly support (see link to the SUS Strategic Plan on the resource page for new program proposal).

The three critical points of emphasis for the SUS 2025 goals are Excellence, Productivity, and Strategic Priorities for a Knowledge Economy.

Excellence

With contributions from interdisciplinary research faculty for the proposed degree program, we will provide an academic program of the highest quality. The new program will integrate world-class expertise from FAU's Big Data Platform, FAU's NSF Big Data Training and Research Laboratory, and FAU's Center for Cryptology and Information Security (nationally recognized as CAE-R through DHS/NSA), as well as distinguished faculty in departments across five colleges. The capstone experience in this program will provide high quality, data-driven research opportunities for undergraduate scholarship. This program will also foster interdisciplinary collaboration and community engagement among the participating colleges and industry partners.

Productivity

While FAU offers many courses related to data science and analytics, there has not been an undergraduate degree program that focused on data science and analytics. This program provides an opportunity to develop a degree that targets the workforce demands of the future and responds to student demand for a structured curriculum in data science and analytics. The proposed degree program will be delivered with a mixture of both on campus and online or

distance learning courses to increase degree productivity.

Strategic Priorities for a Knowledge Economy

One of the priorities of the BOG Strategic Plan is to increase the number of STEM degrees and other areas of strategic emphasis. This proposed program supports the state and university mission for education in STEM disciplines while serving one of the most diverse student bodies in the SUS system. The program is distinctive in its multi-college, interdisciplinary nature, which will prepare students to enter the workforce in industry, business, and government.

FAU's 2015-2025 Strategic Plan and Signature Themes

The proposed program would support the Big Data Analytics platform in FAU's Race to Excellence strategic plan. This BS degree would complement the newly approved, multidisciplinary MS in Data Science and Analytics degree and draw from existing teaching and research expertise at FAU in data analytics, deep learning and AI, high-performance computing, and cybersecurity. The FAU platforms, Community Engagement and Economic Development; Leadership, Innovation, and Entrepreneurship; and Undergraduate Research and Inquiry are also supported by this program.

Participating colleges have strategic plans in support of the University Strategic Plan

Charles E. Schmidt College of Science (CESCOS) strategic plan:

The vision statement of CESCOS is to be recognized for interdisciplinary educational and research programs in science, and to be a leader in the international academic community. Priority 1 in the College's strategic plan is to enrich the educational success experience of students. Within Priority 1, objective A involves increasing the hiring of Tenure-track faculty to meet enrollment curricular needs which requires increasing the number of affiliate faculty involved in the graduate programs (graduate faculty from E&CS, Business and A&L); objective B is to promote curriculum and pedagogical innovation; objective C involves increasing support to design new courses to increase undergraduate and graduate programs, as well as provide competitive graduate student stipends. Some courses of the new proposed program will be developed into synchronous online courses. Increased collaboration between different departments will also encourage applications to new funding agencies, many of which favor cross-disciplinary research.

DFS College of Arts & Letters Strategic Plan:

The College provides essential foundational skills in writing, communication, critical thinking, and creative achievement. These foundations not only enable students to succeed in their disciplines, majors, and careers, but also add a holistic dimension to disciplinary knowledge. This fosters an understanding not simply of culture, but of the ways in which knowledge circulates across jobs and careers and into a larger society that is increasingly global and always human. Comprehending current events within the contexts provided by history, political science, philosophy, sociology, and anthropology provides students firmer ground for making decisions and shaping the world around them. We support this approach through three areas of focus. First, we focus on student enrichment initiatives, including developing workforce- oriented programs and preparing the whole citizen. Second, we promote cultures of inquiry and the production of knowledge. Lastly, we connect the college faculty and students to the community.

College of Engineering and Computer Science (COECS) Strategic Plan:

The College of Engineering and Computer Science (COECS) is committed to provide high quality programs of education and research, along a stimulating and productive environment of work, study, and scholarly inquiry for students, faculty, and staff. The College's goals are results-oriented, and can be summarized as follows: (1) encourage students to consider careers in engineering and computer science, (2) prepare graduates with a basis for lifelong personal and professional development that enables them to make lasting contributions in their disciplines, (3) engage students in research and discoveries in emerging disciplines and in related interdisciplinary areas, (4) provide top education preparation that working professionals need to keep pace with developments in their field, and (5) build mutually beneficial linkages with business, industry, schools, and other constituencies.

College of Business (COB) strategic plan:
The College seeks to develop a spirit of inquiry in its graduates and impart relevant techniques for solving problems in a global business environment. In doing so, it instills skills and knowledge that serve as a basis for change in a world where change is the norm. In response to the changing environment of both the University and surrounding region, FAU launched a bold new strategic plan in 2015 to build on strengths of the institution. FAU's College of Business faculty and administration followed with the adjusting and altering of our strategic plan, already in development, to complement the strengths and initiatives of the University. Our new plan harnesses the College's assets to enhance our engagement and impact initiatives, and boldly launches collaborative efforts among faculty, students, staff, alumni, and the business community of our region, and beyond. By committing to action, we are guided by our strategic initiatives to attract and support faculty and students in scholarship and business engagement, while harnessing innovative means to sustain the College's mission. The vision statement of College of Business is that we aspire to be an internationally known and a nationally ranked business school. The mission statement is that Florida Atlantic University's College of Business sustains an environment of entrepreneurial action and intellectual achievement through research and teaching, creating access to educational programs and opportunities for our constituents emphasizing the diverse people, industries, and issues of the south Florida region and beyond.

College of Design and Social Inquiry (CDSI) strategic plan: The College is dedicated to promoting safe, healthy and sustainable communities through education, research and design. We are a unique configuration of professional programs addressing social justice, design, public policy and planning in and for communities. We strive to develop solutions through the integration and synergy of diverse disciplines. In doing so, the College prepares future leaders, scholars, and innovators to advocate for solutions through action.

E. If the program is to be included in a category within the Programs of Strategic Emphasis as described in the SUS Strategic Plan, please indicate the category and the justification for inclusion.

The Programs of Strategic Emphasis Categories:

1. Critical Workforce:
    - Education
    - Health
    - Gap Analysis
2. Economic Development:
    - Global Competitiveness

3. Science, Technology, Engineering, and Math (STEM)

Please see the Programs of Strategic Emphasis (PSE) methodology for additional explanations on program inclusion criteria at the resource page for new program proposal.

The proposed degree is a STEM program, (3) in the above list of Strategic Emphasis Categories, and described in the SUS 2012-2025 Strategic Plan under Economic Development – STEM.

Economic Development - STEM

The proposed BS in Data Science and Analytics offers coursework and laboratory training at the undergraduate level in a wide array of science, technology, engineering, social science, humanities, and mathematics disciplines. Graduates will enter Florida's workforce with the competencies to fill emerging needs in data-driven occupations, cf. Section VIII.I.

F. Identify any established or planned educational sites at which the program is expected to be offered and indicate whether it will be offered only at sites other than the main campus.

The program will be offered via courses at both FAU main and FAU branch campuses, depending on the concentration of the individual student. Many courses will include a distance learning component so that they may be attended from any campus.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

As presented in the report by McKinsey Global Institute on "Big Data: The Next Frontier for Innovation, Competition, and Productivity", the United States faces a growing shortage of 140,000 to 190,000 workers with analytical expertise and shortage of 1.5 million managers and analysts with the skills to understand and make decisions based on the analysis of big data. See https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/big-data-the-next-frontier-for-innovation

A market analysis report (January 2020) by Hanover Research, commissioned by FAU for this degree program found that labor demand in Florida for data science and analytics professions is projected to grow 26.5% from 2016 to 2026 compared to 15.7% total employment growth statewide. A key finding of a Hanover study contracted by FAU in 2017 for the MS in Data Science and Analytics program was that data science and analytics account for the largest share of growth in the information technology sector, with one study finding that nearly half of surveyed businesses have implemented or plan to launch data initiatives in the near future. The Florida Department of Economic Opportunity projects 21,716 new jobs in Florida in DSA by 2026, and the Bureau of Labor Statistics projects that the US will add 491,700 new jobs in DSA by 2028.

Moreover, IBM and the Business-Higher Education Forum, document the rapidly growing

demand for not just data scientists but also specialists in data governance, privacy and security, data product developers, and data-enabled marketing managers, etc. They project that data science and analytics (DSA) jobs will have grown by 39% from 2015-2020 with continued growth in the future. Beyond explicit DSA positions, they also identified that other positions requiring certain data skills such as clinical data analysis, data visualization, and machine learning, etc, are also growing rapidly. See https://www.ibm.com/downloads/cas/3RL3VXGA. This degree program would provide a pathway for training not only dedicated data scientists but also for students in other areas to obtain data-related skills.

The employment outlook for graduates with skills in data science/analytics is similarly strong in Palm Beach County (Table 3), with relevant occupations projected to grow at an above average 15.2% between 2016 and 2024. (By comparison the aggregate rate of growth for all occupations in the county is 12.6%).

Table 3: Palm Beach County Occupational Projections, 2014-2024*

SOC Title	Employment		Change 2016-2024		Avg. Annual Openings
	2016	2024	Number	Percent	
Computer and Information Systems Managers	970	1,172	202	20.8%	36
Computer Programmers	1,054	1,029	-25	-2.4%	26
Software Developers, Applications	3,010	3,542	532	17.7%	108
Software Developers, Systems Software	802	934	132	16.5%	28
Computer Occupations, All Other	360	415	55	15.3%	11
Operations Research Analysts	288	373	85	29.5%	16
Statisticians	22	32	10	45.5%	2
Total – All Data Science Occupations	**6,506**	**7,497**	**991**	**15.2%**	**227**

Source: Florida Department of Economic Opportunity
*Some occupations are not listed due to lack of available data at the county level.

In Fall 2018 and Fall 2019, FAU hosted a single day Data Science and Analytics Conference on the Boca Raton campus to facilitate interaction between local business and industry representatives and FAU faculty. The interest from local business and industry was strong with 180 participants the first year and over 200 the second year. Companies that participated in both conferences include Motorola Solutions, Magic Leap, Max Planck, TransUnion, JM Lexus, VIACOM, Southeast Toyota Finance, Ryder, ADT, HomeHero, Ultimate Software, Jackson Memorial Hospital, IBM, Levitas, PlayWire, AerLogs, Data Oasis, SurfBigData, The PGA of America, Life Extension, SIVOTEC Analytics, End Point Systems, Palm Beach Orthopedic Institute, Jackson Memorial Hospital, Andinum, Inc., Royal Caribbean Cruise Lines, Leonovus, Gretel, Inc., Trove Predictive Data Science, Producify, MDVIP, Palm Health Foundation, Surefoot, Strategic Point Partners, Supermicro Computer, Inc., Universium Technologies, Data BI Analytics, Teach Link, Debarshi Data, ReachLink, EXCEL SS, Wyzoo, M3, Veriato, L Brown and Company, Law Bulletin Media, Las Olas Capital Advisors, Champion Solutions Group, Gustie Creative, LLC, Progressive Insurance, AvLab, People's Trust Insurance, Zeus Consulting Services, School District of Palm Beach County, CAPGEMINI, MimiCom24, Zimmerman Advertising, and PyData. Also FPL / NextEraEnergy, United Technologies / Carrier, and Modernizing Medicine participated in at least one of the conferences.

Many local companies such as Office Depot, FPL, Cendyn, Magic Leap, MDVIP, Palm Beach Orthopedic Institute, and Broward Health have inquired about FAU degree offerings in Data Science and Analytics and stated their desire to hire FAU graduates in this area. For example, Broward Health has expressed interest in acting as an internship or practicum host site or a Data

Science Fellowship host site, possible educational opportunities for their employees, participating in FAU Data Science career fair events, and involvement in data science related conferences.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

A market analysis report (January 2020) by Hanover Research (Appendix L), commissioned by FAU for this degree program, found strong demand in Florida and the Southeast region for a Bachelor of Science in Data Science and Analytics degree, and the interdisciplinary focus of the degree was found to be unique. A benchmark comparison of degree completions in data science and analytics fields in Florida and labor market demand versus all degree completions and all occupations indicates that this would be potentially a high growth program. Bachelor's degree conferrals in related fields from 2014 to 2018 grew at an annual rate of 8.2% in Florida versus 2.0% across all degree fields.

Student demand is expected to be high due to the attractive salaries in this field. From the Hanover study (Appendix L), "According to a 2017 report by IBM, the average salary across data science and analytics occupations is $80,265. This figure is nearly $30,000 higher than the average annual salary in the US ($51,960) and corresponds to "a premium of $8,736 relative to all bachelor's and graduate-level jobs." "

Below are tables with income and employment demand data compiled from the US Bureau of Labor Statistics and the Florida Department of Economic Opportunity that describe national and state projections for a selection of DSA-related fields. These tables were compiled from the Search by CIP or SOC Tool SRS 1-29-20.xslx using SOC codes that are most closely related to DSA with entry-level degree at the Bachelor's level and that represent the broad range of disciplines in the proposed degree program. Representative CIP Titles related to DSA are shown.

US Bureau of Labor Statistics

SOC 2010 Occupation Title	SOC 2010 Code	CIP 2010 Title	Employment 2018	Employment 2028	Employment Change 2018-28 Number	Employment Change 2018-28 Percent	Median Annual Wage 2018
Information Security Analysts	15-1122	Information Technology, Information Assurance	112,200	147,700	35,500	31.6%	$ 98,350
Software Devel. & Systems	15-1133	Artificial Intelligence, Informatics	421,300	463,900	42,600	10.1%	$110,000
Database Administrator	15-1141	Data Modeling, Database Admin.	116,900	127,400	10,500	9.0%	$ 90,070
Computer Occupations, Other	15-1199	Data Processsing, Info. Tech., Accounting	412,800	455,000	42,200	10.2%	$ 90,270
Statistician	15-2041	Research & Quant. Meths. Business Statistics	44,400	58,000	13,600	30.6%	$ 87,780
Biological Scientist, All Other	19-1029	Biostatistics, Bioinformatics, Biomathematics	47,100	49,800	2700	5.7%	$ 79,590
Social Science Research	19-4061	Social Sciences, General	39,500	43,100	3,600	9.1%	$ 46,640
Statistical Assistants	43-9111	Accounting Technology	13,000	14,100	1,100	8.5%	$ 48,330
Nationwide Projections			**1,207,200**	**1,359,000**	**151,800**	**12.6%**	

Florida Department of Economic Opportunity

SOC 2010 Occupation Title	SOC 2010 Code	CIP 2010 Title	Employment 2018	Employment 2028	Employment Change 2018-28 Number	Employment Change 2018-28 Percent	Median Annual Wage 2018
Information Security Analysts	15-1122	Information Technology, Information Assurance	5,311	6,738	1,427	26.9%	$ 89,149
Software Devel. & Systems	15-1133	Artificial Intelligence, Informatics	18,174	20,776	2,602	14.3%	$ 99,050
Database Administrator	15-1141	Data Modeling, Database Admin.	8,166	9,229	1,063	13.0%	$ 85,467
Computer Occupations, Other	15-1199	Data Processsing, Info. Tech., Accounting	11,484	12,926	1,442	12.6%	$ 76,502
Statistician	15-2041	Research & Quant. Meths. Business Statistics	996	1,334	338	33.9%	$ 80,621
Biological Scientist, All Other	19-1029	Biostatistics, Bioinformatics, Biomathematics	1,814	1,976	162	8.9%	$ 75,005
Social Science Research	19-4061	Social Sciences, General	267	262	-5	-1.9%	$ 47,008
Statistical Assistants	43-9111	Accounting Technology	410	473	63	15.4%	$ 45,490
Statewide Projections			**46,622**	**53,714**	**7,092**	**15.2%**	

C. If substantially similar programs (generally at the four-digit CIP Code or 60 percent similar in core courses), either private or public exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). In Appendix C, provide data that support the need for an additional program.

There are three undergraduate degrees in data science or closely related fields in the SUS: existing BS in Data Science at FPU (CIP 11.0802), proposed BS in Data Science at FAMU (CIP 11.9999), and BS in Information Science at USF (CIP 11.0104). This program would differ from SUS programs in similar areas due to the breadth of the application areas. No other undergraduate program uses the 30.0601 CIP code. The above programs do not contain a social science component nor combine STEM with business and social science to the extent envisioned in the proposed program.

D. Use Table 1 in Appendix A (1-A for undergraduate and 1-B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 30 credit hours per year and graduate FTE will be calculated as 24 credit hours per year. Describe the rationale underlying enrollment projections. If students within the institution are expected to change majors to enroll in the proposed program at its inception, describe the shifts from disciplines that will likely occur.

The program steering committee projects an average of 10 students for each of the concentrations for a total headcount of 30 students in the first year. A projection of half full-time and half part-time enrollment leads to total FTE as 75% of total HC, See Table 1-A in Appendix A. Students working towards degrees in other disciplines may change majors in the first few years of offering the program to seek out a program which is more focused in data science. Some disciplines that could be affected are Computer Science, Mathematics, and Information Technology and Operations Management. The enrollment is projected to grow to 15-20 students for each concentration by Year 5. The headcount for Upper-level students who are transferring from other majors within the university increases in Year 2 due to the addition of the fourth Data Science in Society Concentration.

Comparing to related BS degrees in the SUS: USF had an enrollment of 227 students in Fall 2018 in the BS in Information Science degree program, and FPU had an enrollment of 40 students in Fall 2018 (Year 5 of the program) in the BS in Data Science degree program. As stated above, each of these programs have a different emphasis and scope form the program being proposed here.

E. Indicate what steps will be taken to achieve a diverse student body in this program. If the proposed program substantially duplicates a program at FAMU or FIU, provide, (in consultation with the affected university), an analysis of how the program might have an impact upon that university's ability to attract students of races different from that which is predominant on their campus in the subject program. <u>The university's Equal Opportunity Officer shall review this section of the proposal and then sign and date Appendix B to indicate that the analysis required by this subsection has been completed</u>.

FAU is the most ethnically diverse institution in the State of Florida (29th nationwide). Minorities currently make up 44.83% of the FAU enrollment, and FAU is designated by the DOE Office of Postsecondary Education as a minority serving institution. Indeed, of the 29,606 students enrolled at FAU (all colleges) in Fall 2018 whose ethnicity was known, 12,574 were white and 13,376 were URM. Over the last five years, Hispanic and African American enrollments have increased more than that of any other groups; FAU's student body will soon be "majority minority", mirroring the predicted demographic composition of the USA in the near future. Approximately 51.2% of undergraduate students at FAU in programs related to DSA belong to underrepresented minority groups (IPEDS-URM) with 47.2% Hispanic or African American. This information was provided by FAU IEA office. Thus there is already a diverse pool of students entering FAU from which this program can recruit.

FAU will work with local state colleges, Palm Beach State College, Broward College, and Miami-Dade State College, through articulation workshops to create a pipeline for underrepresented minority students to enter the program. Indeed, Miami-Dade State College has already reach out to FAU about the inception of this program. Underrepresented minority students may also be recruited from local schools and career fairs.

III. Budget

A. Use Table 2 in Appendix A to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 in Appendix A to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

Education & General funds will be reallocated to support the new program in Year 1 as follows. The five common core courses, Mathematics of Data Science, Tools for Data Science, Experimental Design and Data Science, Data Management and Analysis with Excel, and Artificial Intelligence for Social Good will require 12.5% annual faculty effort each. The concentration core courses, such as RI:Introduction to Data Science and Computational Statistics, will also require 12.5% annual faculty effort each, even though they are pre-existing courses, since the number of students from this program will be larger than in elective courses and some are research and inquiry intensive.

Most of the other courses listed in the core or the concentrations are already being taught as

part of other programs. In Year 1, students in this new program would occupy a few seats across several existing courses in without the need for additional sections. Each college has this capacity in its current offerings, and one such course would be approximately 6.25% of annual effort for one faculty member. Since this degree is distributed over five different colleges, Table 4 projects that most of the listed faculty would teach only one or two such courses per year. This cost is reflected in the Reallocated Base in Table 3 for Year 1.

The faculty salaries and benefits projection in Table 3 is based on the effort projection in Table 4. Increased effort is projected if a faculty member would be responsible for supervising a capstone project in the amount of 3.75% annual effort for each capstone student. Also, one faculty member in each college would have advising and oversight roles in the program which is approximated as 1% annual effort.

In Year 5, due to the projected enrollment growth in the program, the effort is approximately doubled based on: the addition of capstone supervision effort, the doubling of sections of elective courses that would have enrollment from this program, and doubling the number of sections of the common core courses, and the addition of the fourth Data Science in Society Concentration (Year 2). In this calculation, some of the projected increase in enrollment is absorbed by having a few more seats taken in elective courses without extra sections being added and increased size of the sections of the common core courses.

B. Please explain whether the university intends to operate the program through continuing education, seek approval for market tuition rate, or establish a differentiated graduate-level tuition. Provide a rationale for doing so and a timeline for seeking Board of Governors' approval, if appropriate. Please include the expected rate of tuition that the university plans to charge for this program and use this amount when calculating cost entries in Table 2.

Not Applicable.

C. If other programs will be impacted by a reallocation of resources for the proposed program, identify the impacted programs and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

No programs will be significantly impacted by a reallocation of resources. The colleges and departments participating in the proposed degree have already developed elective courses and certificate programs to serve increased student interest in data science and analytics. This has already precipitated a shift in faculty effort and instructional resources to this area. Some elective courses in related areas that are not part of this degree program may see reduced demand, and hence be offered less frequently.

The area of data science and analytics is well-suited for undergraduate research and inquiry. Already, many undergraduate students perform research in this area in the Machine Perception

and Robotic Cognition (MPCR) Lab, in FAU's NSF-funded Artificial Intelligence and Deep Learning Lab, through cooperation with the Max Planck Florida Institute for Neuroscience, and other externally funded research labs. The capstone experience required for this degree would increase the number of undergraduate research students at FAU.

D. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

For general education and elective courses, the effects of increased enrollment will be dispersed across multiple colleges, and departments have the capacity to accommodate these students in existing sections. Many of the courses in the proposed concentrations are existing courses that have already been developed to serve student interest in data science and analytics and would benefit from more consistent enrollment that would result from a major focused in data science. The new common core courses, which amount to 1 or 2 courses in each department can be accommodated with existing resources.

E. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

Faculty in the participating departments already have multiple extramural research grants from a variety of federal agencies and other sources. The faculty involved in this program will continue to seek such grants and where appropriate request funding for undergraduate research for capstone projects. The FAU Career Center also has the capability to connect students with internship opportunities locally and nationwide. The faculty will work together with the professional advisory board to identify internships and other opportunities for local partners to contribute to the success of this degree program.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Tables 1 and 2 in Appendix A, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

Society is being transformed by data-driven and artificial intelligence methods applied in the domains of science, industry, government, and social welfare. As described in Section II.A., the pressing demand for skillful data scientists is made evident by the 2020 Hanover Market Analysis (Appendix L) which includes data from the US Bureau of Labor Statistics and the FL Department of Economic Opportunity. The proposed program would provide a multifaceted education that is focused in data science and analytics and utilizes expertise from five colleges.

IBM and the Business-Higher Education Forum document the rapidly growing demand for not just data scientists but also specialists in data governance, privacy and security, data product developers, and data-enabled marketing managers, etc. Beyond explicit DSA positions, they also identified that other positions requiring certain data skills such as clinical data analysis, data visualization, and machine learning, etc., are also growing rapidly. Moreover, there are many

local and state organizations from business, industry, and government that have participated in conferences, partnered with FAU, or otherwise indicated a desire to hire FAU graduates in data science, cf. Section II.A. Graduates from this program will be trained across disciplines to help fill these local, state, and national needs.

The academic infrastructure created for this degree program will synergistically enhance the graduates from related disciplines who will be able to gain more data-related skills, as described in Section VI.B. The proposed program would support the Big Data Analytics platform in FAU's Race to Excellence strategic plan, and it would advance the state and university mission to educate STEM students at one of the most diverse student bodies in the SUS. This BS degree would complement the newly approved, multidisciplinary MS in Data Science and Analytics degree and draw from existing teaching and research expertise at FAU in data analytics, deep learning and AI, high-performance computing, and cybersecurity, cf. Section VI.A.

The capstone experience will provide graduates from this program with a research, internship, or applied project experience that will enhance the research of FAU's data scientists with potential economic and social impacts in the areas of applied statistical modeling, data mining and machine learning, fault detection, cybersecurity, criminal justice, informational system and operational management, drug discovery, and global environmental change.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a separate request to the Board of Governors for an exception along with notification of the program's approval. (See criteria in Board of Governors Regulation 6C-8.014)

Not Applicable.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see link to the Common Prerequisite Manual on the resource page for new program proposal). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

There are currently no other degree programs in the SUS that use the 30.0601 CIP code. The only

prerequisite for the proposed program is MAC 1105, College Algebra, which is a required prerequisite for the core course MAP 2190, Mathematics for Data Science.

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that Florida College System transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in Board of Governors Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

Not Applicable.

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see link to the Statewide Articulation Manual on the resource page for new program proposal). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

Not Applicable.

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan (see link to the SUS Strategic Plan on the resource page for new program proposal).

Since embarking on its Strategic Plan for Race to Excellence 2015-2025, Big Data Analytics has been one of the most widely-supported platforms in the strategic plan. FAU colleges and units have shown tremendous buy-in to this platform. The strategic plan consists of 4 research pillars supported by research institutes and 9 platforms to focus scholarly activity in support of the pillars. FAU has been approved as a University of Distinction in Applied Artificial Intelligence and Big Data Analytics and intends to transition Big Data Analytics from its current status as a platform to a pillar in the university's strategic plan.

The proposed program and the Master of Science in Data Science and Analytics that was approved last year will form the core curricular programs in support of the continuing development of the Artificial Intelligence and Data Science platform / pillar. This will create a vertically integrated research environment of both undergraduate and graduate students working with postdoctoral and faculty researchers.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The colleges of Science, Engineering, and Business have already begun to enhance their existing bachelors' programs by creating new elective courses in various aspects of data science and analytics as well as creating new interdisciplinary certificate programs. These existing academic programs will benefit from having a major that is focused on data science and with multidisciplinary exposure. The colleges of Arts and Letters and Design and Social Inquiry are

developing new data-focused, quantitative courses for the proposed degree program which will provide the opportunity for students in existing programs in these colleges to gain exposure to data science through elective coursework. The rich curricular offerings being developed across disciplines will provide new opportunities for students. The proposed BS degree will also provide a platform for students to enter the new MS in Data Science and Analytics degree that launched Fall 2019.

The Center for Cryptology and Information Security was recognized as a National Center of Academic Excellence in Information Assurance/Cyber Research. FAU recently received ten-million dollars from the United States Department of Transportation to establish the Freight Mobility Research Institute. The Quantum@FAU is the joint effort among Science, I-SENSE and Engineering which has a physical lab Q-OWLS standing for Quantum Optics with Lasers. Furthermore, FAU has established several core facilities including a Biostatistics Collaborative Core, Water Analysis Lab, Engineering & Technology Core, MRI & Human Imaging and Comparative Medicine core. The research interests of participating faculty range from statistical modeling, machine learning and data mining, business analytics, computing and informatics, cybersecurity and data science for social good. Students will gain hands-on diverse experience in these areas through undergraduate research and the capstone course.

These areas fit directly into the new FAU Strategic Plan with clear links to the pillars of Biomedical Research with healthcare data-driven and the platform of Economic Development and Big Data platform, cf. Section X.B.

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology in table format of the activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

The BSDSA Planning Committee for this degree was composed of

- Kenneth Dawson-Scully (chair), Associate Vice President for Strategic Initiatives and Associate Professor (Science/Biology),
- William Kalies, Associate Dean for Graduate Studies and Professor (Science/Math),
- Mihaela Cardei, Associate Dean for Graduate Studies and Professor (Engineering/Computer Science),
- Tamara Dinev, Chair of the Information Technology and Management Department and Professor (Business),
- Kevin Wagner, Chair of the Political Science Department and Professor (Arts and Letters),
- Wendy Guastaferro Interim Director and Associate Professor of the School of Criminology and Criminal Justice and Associate Dean for Research (Design and Social Inquiry).

In Spring 2019, the BSDSA Planning Committee along with faculty members from the Department of Computer and Electrical Engineering and Computer Science, faculty members from the Department of Mathematical Sciences, the former Associate Dean of Graduate Studies (Arts & Letters), the FAU Director of Assessment, Accreditation, and Articulations, and faculty from the FAU Wilkes Honors College met multiple times to discuss the framework for the curriculum using

the Park City Curriculum Guidelines (Appendix K) and other sources.

Based on the initial discussions, a pre-proposal was written by the Associate Dean for Graduate Studies (Science/Math) in September 2019 which was presented to the CAVP committee by the Senior Associate Provost and approved by CAVP on September 25, 2019.

In Fall 2019, the curriculum, including common core, concentrations, new courses, electives table, and capstone were finalized and drafted.

In Spring 2020, using a Hanover Market Study and other sources, this full proposal was written by the Associate Dean for Graduate Studies (Science/Math) and approved by the BSDSA Planning Committee, the Senior Associate Provost, and all of the faculty governance committees of the departments, colleges, and university with FAU Board of Trustees approval in June 2020.

Planning Process

Date	Participants	Planning Activity
October 13, 2018	Mathematics / ITOM / Engineering Faculty	Discussions with local business, industry, and government representatives at first annual FAU Data Science Conference
March - May 2019	BSDSA Planning Committee	Initial curriculum discussions
September 2019	BSDSA Planning Committee	Development of pre-proposal
Oct – Dec 2019	BSDSA Planning Committee	Curriculum development
November 2, 2019	Mathematics / ITOM / Engineering Faculty	Discussions with local business, industry, and government representatives at second annual FAU Data Science Conference
January 7, 2020	Hanover Research	Phase 1 Market Study completed
January 21, 2020	Hanover Research	Market Study and Analysis completed
Jan – Feb 2020	BSDSA Planning Committee	Preparation of full proposal

Events Leading to Implementation

Date	Implementation Activity
September 25, 2019	Pre-proposal presented to and approved by CAVP
February 10, 2020	Submission of full proposal to Senior Associate Provost for review
Feb 17 – Mar 19, 2020	Approvals from undergraduate programs committees from 5 colleges and departments: Science/Math, Engineering/CS, Business/ITOM, A&L/Political Science, CDSI/Criminology and Criminal Justice
March 30, 2020	Approval by FAU Undergraduate Programs Committee
April 8, 2020	Approval by FAU Academic Planning and Budget Committee
April 16, 2020	Approval by FAU University Faculty Senate Steering Committee
April 27, 2020	Approval by FAU University Faculty Senate
June 2020	Approval by FAU Board of Trustees

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

State of Florida requires seven year program review. FAU follows BOG recommendations.

Furthermore, all FAU degree programs are required to have annual review on top of the periodic review or accreditation. Internal review is done via the assessment portal at http://www.fau.edu/iea/assessment/index.php. Accreditation differs from department to department as needed.

The Department of Mathematical Sciences

The Department of Mathematical Sciences offers both Bachelor of Science and Bachelor of Arts in Mathematics degrees. The department has reviewed its undergraduate program internally as part of its regular program assessment, and one of strategic goals related to the proposed degree is to broaden and modernize the departmental programs to include more data science, statistics, and interdisciplinary courses and undergraduate research.

The complete progress report for all action items in the seven year program review for the Department of Mathematical Sciences is in Appendix J. There are three items directly relevant to this proposal:

Recommendation 12: *Undertake a complete de novo redesign of the Undergraduate curriculum.* The department leveraged two OURI curriculum grants to modernize the undergraduate program, and in addition introduced a new 3000-level course (launched in Fall 2019) that should help in improving success in two critical 4000-level courses.

Recommendation 14: *Establish an undergraduate major in statistics.* There is currently no plan to establish such a degree. Instead, the department participates in a multi-college effort to establish a BS in Data Science and Analytics.

Recommendation 19: *Broaden course offerings in mathematics to emphasize applicability of mathematical techniques to provide solutions in other disciplines*. The department now offers several courses, emphasizing the applicability of mathematical techniques to other disciplines. Specifically, Applied Mathematical Modeling (MAP 4103), RI: Industrial Problems in Applied Math (MAP 4913) and RI: Computational Statistics (STA 4102) can be named here.

The Department of Computer and Electrical Engineering and Computer Science (CEECS)

The CEECS department aims to find a balance of adhering to the mathematical and scientific fundamentals of our disciplines while also following their evolution and reflecting them in our offered curriculum and student training. We emphasize critical thinking, problem solving and teamwork, and stress the significance of lifelong learning. The goals of the College of Engineering and Computer Science are to encourage young people to consider careers in engineering and computer science by introducing them to these fields while in middle and high school; to prepare graduates in ways that provide them a basis for lifelong personal and professional development and that enable them to exercise leadership and make lasting contributions in their disciplines; to continue on new roads of research and discovery in its existing areas of expertise, in emerging disciplines and in related interdisciplinary areas; to provide the educational resources that working professionals need to keep pace with developments in their field; and to magnify its positive impact in serving regional, state, national and global needs by building mutually beneficial linkages with business, industry, state colleges, K-12 programs and schools and other constituencies. CEECS department offers undergraduate programs of study leading to the degrees of Bachelor of Science with major in Computer Science, Bachelor of Science in Computer Engineering, and Bachelor of Science in Electrical Engineering. A minor in Computer Science is

also available. The bachelor programs in the CEECS department are accredited by the Computing Accreditation Commission of ABET. The last ABET review took place in 2014. All the programs (Computer Science, Computer Engineering, Computer Science) have received a 6-year accreditation. There were no reported deficiencies and weaknesses. The next ABET review will take place in Fall 2020 semester.

A Data Science certificate program, designed jointly by CEECS department and Mathematical Sciences, provides an in-depth study of the methods to manage, analyze and extract knowledge from data. The Data Science certificate curriculum requires 15 credits from Computer Science, Mathematics and Statistics.

The CEECS department underwent a program review in 2018. The program review report and action plan are included in Appendix J.

The Department of Information Technology and Operations Management (ITOM)

The ITOM's strategic goal is to develop competence in information systems, operations management (including quality management) and related decision-sciences disciplines for traditional and nontraditional students across the College of Business; to produce skilled individuals proficient in information technology who are able to contribute effectively to their organizations and communities in an ever-evolving technological environment; to engage in an active partnership with the business community; and to continually innovate and increase the quality of its educational and research activities in a manner that increases education effectiveness and global reach. **FAU College of Business BBA Learning Goals and Objectives for our Graduates** are the following:

Goal 1: Students will demonstrate business knowledge and skills

Objectives:

1. Students will demonstrate general knowledge of disciplines in the business core
2. Students will demonstrate an understanding of global business and cultural diversity
3. Students will demonstrate an understanding of legal and ethical aspects of business practices

Goal 2: Students will be proficient in business-related technologies

Objectives:

1. Students will be knowledgeable of current technology applications
2. Students will select and utilize appropriate technologies for business practices

Goal 3: Students will communicate effectively

Objectives:

1. Students will demonstrate proficiency in oral communications by preparing and delivering professional business presentations
2. Students will demonstrate proficiency in written communication by creating business documents with appropriate language, organization, content and conclusions

Goal 4: Students will be effective problem solvers and decision makers

Objective:

1. Students will demonstrate decision making skills by identifying, evaluating, researching, and proposing solutions for business problems

AACSB accreditation visits are every 5 years, the last visit being in January 2018. ITOM conducted internal review and submitted assessment. We do not intend recommending the BS-DSA for AACSB accreditation due to the limited amount of Business content in the program. AACSB typically requires a minimum of 50% of the program content to be business related and taught

by business faculty.

AACSB Items to Address/Specific Recommendations:

1. Since 2012, student enrollments have increased from 7,100 to 8,100 in 2017. While the numbers of full-time faculty have not changed over this period, the College has implemented several technology-based approaches to increase its capacity and efficiency, such as online and lecture capture. For example, lecture capture allows the College to enroll large numbers of students in a course, well beyond the room capacity, while encouraging the students to engage synchronously or asynchronously by viewing the recorded videos. However, even with these efficiencies, it is not clear that this level of growth can be sustained without adding additional faculty.
2. The College needs to address faculty needs in concert with its future enrollment growth.

The complete progress report for all goals in the seven year program review for the Department of Information Technology and Operations Management is in Appendix J. There is one goal directly relevant to this proposal:

Goal 1: To distinguish and brand the Department and the College in Business Analytics.

· **Creation of Center for Business Analytics**. Since the Program Review was conducted, the University has taken a number of steps to advance data analytics as an institutional priority which has mitigated the urgency and importance of establishing a distinct Center for Business Analytics. At the same time, the Department Chair has played an integral role in coalescing targeted partners to advance analytics within the College and she serves as the College's representative on the University Data Analytics Strategic Platform Steering Committee.

· The Vice President of Research created the university-wide Center for Data Analytics, and appointed Engineering Professor Taghi Khoshgoftaar as Chair of the Center.

· Within the College, Business Analytics continues to be an important component of the Department's mission and the College's strategic efforts. Key objectives in support of both include industry participation, strategic faculty hiring, and curriculum and program development. While a number of these objectives have been achieved, efforts to strengthen analytics are ongoing.

· Interested faculty across departments in the College have worked to advance Business Analytics across disciplines. For example, courses in Health Administration analytics and Sports Management analytics have been offered and are very popular. Another achievement is the creation of the Business Analytics track in the MS in Information Technology and Management program. Similarly, we have created a Business Analytics Graduate Certificate for professionals and students from other fields. Both of these programs are highly popular as well.

The Department of Political Science offers undergraduate and graduate courses that contribute to the understanding of American politics, comparative politics, and international relations. The Department embraces the epistemology of social science research and helps students develop skills important to this field, and many others, including written and oral communication and

critical thinking. The faculty and staff in the Department strive to help students meet their academic goals. The department is dedicated to advancing the study of political science through research, teaching and scholarship. Our diverse approach is based on teaching critical thinking, and students are encouraged to engage in quantitative and qualitative research by applying the basic principles of scientific methodology. In addition to developing these skills, the Department is dedicated to providing practical experience and advanced research opportunities through, for example, the Honors Program, Campaigning Program, Diplomacy Program, research-oriented upper division courses, directed independent studies, and internships.

The complete progress report for all action items in the seven year program review for the Department of Political Science is in Appendix J.

The School of Criminology and Criminal Justice (SCCJ) has 13 tenure-track faculty and two full-time instructors. The SCCJ is one of FAU's largest undergraduate degree programs, with 1500 FTE on average annually. We offer a Bachelor of Arts and a competitive Master's of Science in Criminology and Criminal Justice in a student-friendly environment. We also offer certificate programs in paralegal and legal nurse consulting. The SCCJ faculty have secured over $3m in external grant funding within the past three years. Our faculty regularly publish research in peer-reviewed articles in criminal justice, health, policing, and policy journals. Five SCCJ faculty have received Presidential Awards for research, teaching, and/or service.

The complete progress report for all action items in the seven year program review for the School of Criminology & Criminal Justice is in Appendix J.

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

CONTENT KNOWLEDGE (Declarative Knowledge): Students graduating with a B.S. degree in Data science and Analytics will demonstrate knowledge of the major concepts (1) of using statistics to analyze data, (2) of leveraging computer tools for analyzing and cleaning data, and (3) of using data science to solve application problems.

COMMUNICATION (Written Communication): Students graduating with a B.S. in Data Science and Analytics degree will produce writing that is well organized and grammatically correct, and they will be able to concisely describe societal implications of large-scale data analysis applications.

CRITICAL THINKING (Analytical Skills): Students graduating with a B.S. in Data Science and Analytics degree will correctly analyze and determine the validity of mathematical and statistical arguments. They will apply best practices when using data science to solve concrete problems.

The complete proposal Academic Learning Compact is in Appendix G.

B. Describe the admission standards and graduation requirements for the program.

This is a multi-college interdisciplinary program with several concentrations and jointly administered by the five participating colleges, mainly through an oversight committee. Each concentration will have a common application deadline.

Admissions Requirements
All students must meet the minimum admission requirements of the University. Please refer to the Admissions section of the FAU catalog.

Prerequisite Coursework for Transfer Students

Students transferring to Florida Atlantic University must complete lower-division requirements including the requirements of the Intellectual Foundations Program and College Algebra and Introductory Statistics. Lower-division requirements may be completed through the A.A. degree from any Florida public college, university, or community college or through equivalent coursework at another regionally accredited institution. Before transferring and to ensure timely progress toward the BSDS degree, students must also complete the prerequisite courses for their major as outlined in the Transition Guides.

All courses not approved by the Florida Statewide Course Numbering System that will be used to satisfy requirements will be evaluated individually on the basis of content and will require a catalog course description and a copy of the syllabus for assessment.

Graduation Requirements

Students are required to take six common core courses covering topics in Mathematics, Computer Science, Business, and the Humanities that are foundational to the broad study of Data Science and Analytics. Each concentration requires 7 courses with a mixture of required and elective courses. Students will also take two elective courses from a list courses spanning foundations and applications of Data Science and Analytics from across the University. Finally, students will also complete a capstone experience.

Capstone – BS Data Science and Analytics
The Capstone for the BS degree with a Major in Data Science and Analytics is a cross college course that can be taken multiple times with a minimum of 3 credits as a requirement for the degree. Students apply their theoretical knowledge, methods, and tools acquired during the Data Science program to a real-world problem and will work on a real-world data science project and will engage in processing actual data and applying appropriate analytic methods to the problem. Students will implement a solution using appropriate tools and can work individually or in teams under the supervision of the course instructor or another faculty member. This can be accomplished in the recommended three methods:

1. An approved PROJECT that will be evaluated by the following:
    a. Ability to design, identify, and apply analytic methods to a specific problem

   b. Ability to implement a solution using a suitable programming language and tools
   c. Ability to measure and analyze the performance and robustness of the solution
   d. Ability to write reports and present results
2. A RESEARCH experience which includes a minimum consecutive capstone course over two semesters working in a laboratory with the following deliverables describing the results of their research are required in the senior year.
   a. Submission of a grant proposal is required no later than the second semester of the junior year.
   b. Presentation of a poster or seminar at a local, regional, national or international research conference/symposium describing the results of the research is required in the senior year.
3. A THESIS experience which involves the direct research mentorship by an eligible faculty member with the deliverables describing the results of their research which is to be directly evaluated by the mentor and if needed, a thesis committee:
   a. Written paper.
   b. Seminar.

The complete description of the degree requirements that will be placed in the FAU Catalog is in Appendix F.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The proposed degree will contain 120 semester credit hours: 36 credits of Intellectual Foundations requirements, 48 credits of major requirements, and 36 credits of unrestricted electives. The major requirements contain 18 credits of required common core courses, 21 credits of concentration courses, some required and some restricted electives, 6 credits of restricted electives from across many disciplines, and 3 credits of a capstone experience. The complete description of the degree requirements that will be placed in the FAU Catalog is in Appendix F, and the complete description of the Intellectual Foundations requirements is in Appendix H. Appendix K contains the Curriculum Guidelines for Undergraduate Programs in Data Science produced by an Undergraduate Faculty Working Group at the Park City Math Institute PCMI in 2016.

As stated in I.A., the Data Science and Society concentration will begin in Year 2, and hence the concentration Is not listed in Appendix F nor in the Section VIII.D. below. However, the concentration can be summarized as follows:

The Data Science in Society Concentration draws upon disciplinary traditions represented by units in the Colleges of Arts and Letters and Design and Social Inquiry. The concentration provides students a dynamic mix of core courses and free electives that provide essential training and critical reflection on a scope of societal, political, and ethical considerations brought on by the age of data science and algorithmic cultures. The concentration includes courses designed from an interdisciplinary vantage as well as those representing specializations from various academic units, disciplines, and subfields. The concentration curriculum spans a wide array of course designs and learning objectives including: survey introductory courses, inquiry and research

design courses, methods courses, research oriented courses, practice and skill building oriented courses, and topical courses that focus on specialized problems or contexts associated with data science and society.

The concentration core will be comprised of four courses currently under development. It is anticipated that these courses will be housed in the College of Arts and Letters' School of Interdisciplinary Studies with the IDS prefix facilitating faculty contributions from across Arts and Letters and Design and Social Inquiry. These courses include: "Introduction to Data Science and Society" (3 credits), "Inquiry and Research and for Societal Data Studies" (3 Credits), "Case Studies in Applied Data Studies" (3 Credits) and "Critical Data Studies" (3 Credits). These concentration core courses provide a survey overview to societal issues associated with big data and data science, a research design course that develops student capacity to develop research questions and appropriate methodologies from social science and/or humanities-oriented approaches, a research-oriented course that illustrates the work of the practitioner/scholar of data science through analysis of various case studies, and a course that analyzes the political, social, economic, and ethical entailments of data science. This concentration core provides the necessary content, analytic skills, methodological rigor, research experience, and self-reflection on the potential concerns and consequences of data science essential for students interested in academic, professional, or personal engagement with data science.

In addition to the concentration core students in the Data Science in Society Concentration will take an additional 9 credits in electives from either the "Arts and Letters" or "CDSI Electives" for a total of 21 electives in the Concentration.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

Curriculum Requirements:

Common Core		
Introductory Statistics	STA 2023	3
Mathematics of Data Science	MAP 2190	3
Experimental Design and Data Analysis	CAP 2750	3
Tools for Data Science	CAP 2751	3
Data Management and Analysis with Excel	QMB 3302	3
Artificial Intelligence for Social Good	CCJ 3071	3
Data Science Capstone	ISC 4312	3
Common Core Credits:		**21**

Free Electives		
CHOOSE 2 COURSES FROM THE TABLE		
Free Elective Credits:		**6**

Data Science in the Natural Sciences Concentration		
Concentration Core Requirements:		
Introduction to Computational Mathematics	MAD 2502	3
RI: Introduction to Data Science	CAP 3786	3
Computational Statistics	STA 3100	3
Concentration Core Credits:		**9**
Concentration Core Electives: CHOOSE 4 COURSES		
SAS for Data and Statistical Analyses	STA 3024	3

Probability and Statistics 1	STA 4442	3
Probability and Statistics 2	STA 4443	3
Applied Statistics 1 with Lab	STA 4234/4202L	3
Applied Statistics 2	STA 4702	3
Statistical Designs	STA 4222	3
Applied Time Series and Forecasting	STA 4853	3
Introduction to Biostatistics	STA 3173	3
RI: Industrial Problems in Applied Math	MAP 4913	3
Applied Mathematical Modeling	MAP 4103	3
Topology for Data Science	MTG 4328	3
Graph Theory	MAD 4301	3
Cryptography and Information Security	CIS 4362	3
Concentration Elective Credits:		**12**
Concentration Credits:		**21**

Data Science and Engineering Concentration

Concentration Core Courses:		
Introduction to Programming in C, if applicable*	COP 2220	3
Foundations of Computer Science	COP 3014	3
Data Structures and Algorithm Analysis	COP 3530	3
Introduction to Data Science and Analytics	CAP 4773	3
Concentration Core Credits:		**12**
Concentration Elective Courses: CHOOSE 3 COURSES		
Introduction to Deep Learning	CAP 4613	3
Introduction to Artificial Intelligence	CAP 4630	3
Introduction to Data Mining and Machine Intelligence	CAP 4770	3
Introduction to Computer Systems Performance Evaluation	CEN 4400	3
Introduction to Database Structures	COP 3540	3
Applied Database Systems	COP 4703	3
Python Programming	COP 4045	3
Introduction to Internet Computing	COP 3813	3
Concentration Elective Credits:		**9**
Concentration Credits:		**21**

* Students that have taken a college-level introductory course in programming can substitute this course with one of the Concentration Elective Courses, with permission of the advisor.

Data Science in Business Concentration

Concentration Core Requirements:		
Introduction to Business Analytics and Big Data	ISM 3116	3
Business Communication for Data Analysts	GEB 3231	3
Data Mining and Predictive Analytics	ISM 4117	3
Advanced Business Analytics	ISM 4403	3
Concentration Core Credits:		**12**
Concentration Core Electives: CHOOSE 3 COURSES		
Contemporary Issues of Digital Data Management	ISM 4041	3
Management of Information Assurance and Security	ISM 4323	3
Database Management Systems	ISM 4212	3
Social Media and Web Analytics	ISM 4420	3
Business Analytics for Marketing and Customer Relations	MAR 4615	3
Revenue Management and Predictive Analytics in the Hospitality and Tourism Industry	HFT 4881	3
Concentration Elective Credits:		**9**
Concentration Credits:		**21**

Table of Elective Courses for all Concentrations

Science Electives:		
Spatial Data Analysis	GEO 4167C	3
Photogrammetry and Aerial Photograph Interpretation	GIS 4021C	3
Applications of Geographic Information Systems	GIS 4048	3
Geospatial Databases	GIS 4118	3
Computational Physics	PHZ 3151C	3
Solar System Astronomy	AST 3110	3
Mathematical Methods in Physics	PHZ 4113	3
Practical Cell Neuroscience	PCB 4843C	3
Laboratory Methods in Biotechnology	BSC 4403L	3
Epidemiology of Infectious Diseases	MCB 4276	3
Concepts in Bioinformatics	BSC 4434C	3
RI: Introduction to Data Science	CAP 3786	3
Computational Statistics	STA 3100	3
SAS for Data and Statistical Analyses	STA 3024	3
Probability and Statistics 1	STA 4442	3
Probability and Statistics 2	STA 4443	3
Applied Statistics 1 with Lab	STA 4234/4234L	3
Applied Statistics 2	STA 4702	3
Statistical Designs	STA 4222	3
Applied Time Series and Forecasting	STA 4853	3
Introduction to Biostatistics	STA 3173	3
RI: Industrial Problems in Applied Math	MAP 4913	3
Applied Mathematical Modeling	MAP 4103	3
Topology for Data Science	MTG 4328	3
Graph Theory	MAD 4301	3
Cryptography and Information Security	CIS 4362	3
Engineering Electives:		
Introduction to Data Science and Analytics	CAP 4773	3
Introduction to Deep Learning	CAP 4613	3
Introduction to Artificial Intelligence	CAP 4630	3
Introduction to Data Mining and Machine Intelligence	CAP 4770	3
Introduction to Computer Systems Performance Evaluation	CEN 4400	3
Introduction to Database Structures	COP 3540	3
Applied Database Systems	COP 4703	3
Python Programming	COP 4045	3
Introduction to Internet Computing	COP 3813	3
Business Electives:		
Introduction to Business Analytics and Big Data	ISM 3116	**3**
Business Communication for Data Analysts	GEB 3231	3
Data Mining and Predictive Analytics	ISM 4117	3
Advanced Business Analytics	ISM 4403	3
Contemporary Issues of Digital Data Management	ISM 4041	3
Management of Information Assurance and Security	ISM 4323	3
Database Management Systems	ISM 4212	3
Social Media and Web Analytics	ISM 4420	3
Business Analytics for Marketing and Customer Relations	MAR 4615	3
Revenue Management and Predictive Analytics in the Hospitality and Tourism Industry	HFT 4881	3
Arts and Letters Electives:		
Research Methods	POS 3703	3
Public Opinion in America	POS 4202	3
Sociological Analysis Quantitative Methods	SYA 4400	3
Research Methods in Biological Archeology	ANT 4192	3
Information Technology in Public Administration	PAD 3712	3
Introduction to the Nonprofit Sector	PAD 4144	3
Research Methods for Public Management	PAD 4704	3
Quantitative Inquiry for Public Managers	PAD 4702	3
CDSI Electives:		
Criminal Justice Technology	CJE 3692C	3
Crime Analysis	CJE 4663	3

Computer Crime	CJE 4668	3
Teen Technology Misuse	CCJ 4554	3
Research Methods in Criminal Justice	CCJ 4700	3
Research Methods in Social Work	SOW 4403	3

E. Provide a one- or two-sentence description of each required or elective course.

Common Core Requirements:

Introductory Statistics (STA 2023) 3 credits
Prerequisite: MAT 1033 or MAC 1105 or MGF 1106 or MAC 2233
An introductory course covering descriptive statistics, probability, binomial and normal distributions, sampling distributions and hypothesis tests, and sampling procedures. Laboratory required. This is a General Education course.

Mathematics of Data Science (MAP 2190) 3 credits
Prerequisite: MAC 1105 with "C" or better
This course will survey mathematical foundations in data science. Topics may include modeling with functions, matrices, solving linear systems, differentiation, integration, multivariate thinking and geometry, regression models, optimization, sensitivity analysis, and graph theory.

Experimental Design and Analysis (CAP 2750) 3 credits
Prerequisite: STA 2023
This course deals with principles of experimental design and data analysis. Topics covered include design of experiments, sampling and analysis of resulting data.

Tools for Data Science (CAP 2751) 3 credits
Prerequisite: None
This course will focus on data manipulation, curation, visualization, exploration, interpretation, and modeling using standard packages and tools employed in the field of data science, as well as best practices for maintaining data and software using version control.

Data Management and Analysis with Excel (QMB 3302) 3 credits
Prerequisite: None
An introductory course covering basic Excel skills for managing information and data, analyzing data, visualizing data through charts and pivot tables, creating scenarios, using functions and automating tasks.

Artificial Intelligence for Social Good (CCJ 3071) 3 credits
Prerequisite: None
In this course students will learn about the social implications of artificial intelligence, data science, and big data, strategies to ensure these systems are accountable to the communities and contexts they are meant to serve, and applied in ways that promote justice and equity.

Data Science Capstone (ISC 4312) 1-3 credits
Prerequisite: Senior standing in the BS in Data Science and Analytics and having completed all core courses
Students in the BS program with Major in Data Science and Analytics will apply theoretical knowledge, methods, and tools to a real-world data science problem. Students can work individually or in teams under the supervision of the course instructor or another faculty member.

Concentration Core and Restricted Electives:

Introduction to Computational Mathematics (MAD 2502) 3 credits
Prerequisite: MAC 2281 or MAC 2311
An introduction to mathematical computation by means of algorithmically solving a number of mathematical problems. Introduction to C++. The emphasis will be on the mathematical algorithms involved with problems from analysis, number theory, combinatorics, algebra, linear algebra, numerical analysis and probability.

RI: Introduction to Data Science (CAP 3786) 3 credits
Prerequisite: COP 2220 or MAD 2502
This research-intensive (RI) course surveys the foundational topics in data science: Data acquisition, data exploration and visualization, data analysis with statistics and machine learning, data at scale via working with big data. The course uses

statistical software to work through real-world examples that illustrate these concepts. Concurrently, students learn statistical and mathematical foundations that power the data scientific approach to problem solving.

Computational Statistics (STA 3100) 3 credits
Prerequisites: (MAC 2312 or MAC 2282), STA 2023 or higher, and some programming experience
Computer algorithms for evaluation, simulation and visualization, random number generation, sampling from prescribed distributions. Simulations, graphics for data display, computation of probabilities and percentiles, hypothesis testing, simple linear regression and multiple regression.

SAS for Data and Statistical Analyses (STA 3024) 3 credits
Prerequisite: STA 2023 or equivalent
This course introduces the SAS language in a lab-based format. The objective is to develop programming and statistical computing skills to address data management and analysis issues using SAS. The course provides an extensive survey of some of the most common statistical tools and provides decision-making strategies in selecting the appropriate statistical method for the data at hand.

Probability and Statistics 1 (STA 4442) 3 credits
Prerequisite: MAC 2282 or MAC 2312
An introductory course treating combinatorics, probability spaces, laws of large numbers, and central limit theorem. An introduction to Markov processes, information theory and applications.

Probability and Statistics 2 (STA 4443) 3 credits
Prerequisite: STA 4442
Properties of test statistics, estimation and testing, linear models, contingency tables; topics from non-parametric statistics, design of experiments or methods of inference.

Applied Statistics 1 (STA 4234) 2 credits
Prerequisite: STA 4442; Corequisite: STA 4202L
Point and interval estimation, hypothesis tests, non-parametric procedures, contingency tables. Essential distribution theory. Linear models, including multiple regression and analysis of variance. Emphasis on data analysis, statistical graphics, and diagnostics via personal computing.

Applied Statistics 1 Lab (STA 4202L) 1 credit
Prerequisite: STA 4442 with grade of "C" or better
Corequisite: STA 4234
This is a first course in regression analysis. Regression analysis explores relationships among variables by modeling a response. The course focuses on data analysis, statistical graphs and diagnostics via personal computing.

Applied Statistics 2 (STA 4702) 3 credits
Prerequisite: STA 4234
Multivariate statistical methods, including the multivariate normal distribution, component analysis, factor analysis, multivariate analysis of variance and regression, discriminant analysis, and causal modeling. Students will use SAS and/or SPSS statistical software.

Statistical Designs (STA 4222) 3 credits
Prerequisites: STA 4234, and one of MAC 2282 or 2312
Basic concepts of experimental design: randomized blocks, Latin squares, incomplete blocks, factorial designs, fractional factorials, nested designs. Introduction to design of sample surveys: simple random, stratified, cluster sampling; complex designs; ratio and regression estimation; enumerative versus analytical surveys. Student project required.

Applied Time Series and Forecasting (STA 4853) 3 credits
Prerequisite: STA 4234 or equivalent
Gives a basic introduction to time series and forecasting methods that can be applied to finance, economics, engineering and the natural and social sciences. Topics covered include stationary processes, ARMA models, modeling and forecasting with ARMA processes, spectral analysis and non-stationary and seasonal time series models.

Introduction to Biostatistics (STA 3173) 3 credits
Prerequisite: MAC 2233 with a grade a "C" or better
Introduces basic statistical concepts and procedures that are necessary to conduct statistical analysis for biological researchers. The topics covered are probabilistic foundations, experimental designs and their analyses, summarizing and visualizing data, inferential statistics, including hypothesis tests and regression modeling.

RI: Industrial Problems in Applied Math (MAP 4913) 3 credits
Prerequisites: (MAP 2302 or MAP 3305) and (MAS 2103 or MAC 2313)
This research-intensive course pits students in small groups against real-world problems provided by industrial partners.

Applied Mathematical Modeling (MAP 4103) 3 credits
Prerequisites: (MAP 2302 or MAP 3305) and (MAS 2103 or MAC 2313)
This course covers the use of differential and difference equations in scientific modeling. Emphasis is on the "modeling" cycle with undergraduate research and inquiry (URI) components.

Topology for Data Science (MTG 4328) 3 credits
Prerequisites: MAS 2103, MAD 2104, and (MAD 2502 or COP 2220)
Introduction to concepts and methods in applied topology and topological data analysis tools, including persistent homology, and their uses in data science: topological spaces, metric spaces, continuity, simplicial complexes, vector spaces, and simplicial homology. Mathematical concepts are grounded by discussions of efficient implementations of computational algorithms and applications.

Graph Theory (MAD 4301) 3 credits
Prerequisites: MAD 2104 and MAS 2103
A first course in theory and applications of graphs including basic properties; coloration; algebraic and geometric aspects; enumeration; algorithms; network flows.

Cryptography and Information Security (CIS 4362) 3 credits
Prerequisites: MAS 2103 and MAD 2502
Classical cryptology, entropy. Stream and block ciphers. Public-key versus symmetric cryptography, one-way and trap-door functions. Primality and factorization, DLP, Diffie-Hellman, RSA and ElGamal cryptosystems. Issues of computer and network security. Secure protocols, identification, authentication, digital signatures, secret sharing schemes.

Introduction to Programming in C (COP 2220) 3 credits
Prerequisite: None
Introduction to programming in C. Variable types, arithmetic statements, input/output statements, loops, conditional statements, functions, arrays and structures. Programming projects in C.

Foundations of Computer Science (COP 3014) 3 credits
Prerequisite: COP 2220 with a "C" or better
Builds programming skills with an emphasis on disciplined program design and coding. Introduction to object-based programming concepts including class design and implementation. Programming in C++.

Data Structures and Algorithm Analysis (COP 3530) 3 credits
Prerequisites: COP 3014 with a "C" or better
Prerequisite or Corequisite: MAD 2104
The design, implementation and run-time analysis of important data structures and algorithms. The data structures considered include sorted arrays, linked lists, stacks, queues, and trees. An approach based on abstract data types and classes will be emphasized. The use of recursion for algorithm design. Class design and implementation in C++. Programming assignments in the C++ language.

Introduction to Data Science and Analytics (CAP 4773) 3 credits
Prerequisites: COP 3530 and STA 4821 with minimum grades of "C" or permission of instructor
This course deals with the principles of data science and analytics. Topics covered include statistical analysis of data, measurement techniques and tools, machine learning methods, knowledge discovery and representation, classification and prediction models.

Introduction to Deep Learning (CAP 4613) 3 credits
Prerequisite: COP 3530 with minimum grade of "C"
This course teaches students basic concepts of deep learning. The course covers three major topics, including statistical machine learning, neural network structures and deep neural networks. Detailed topics include introduction to machine learning algorithms, perceptron learning, multi-layer neural networks, and deep neural network structures and learning algorithms. The lectures include practical sessions dedicated to the implementation and programming of deep learning frameworks.

Introduction to Artificial Intelligence (CAP 4630) 3 credits
Prerequisite: COP 3530 or ISM 4234
A broad introduction to the core concepts of artificial intelligence, including knowledge representation, search techniques,

heuristics and deduction. Programming in Lisp and possibly other software environments.

Introduction to Data Mining and Machine Intelligence (CAP 4770) 3 credits
Prerequisites: STA 4821 and COP 3530
This course deals with the principles of data mining. Topics include machine learning methods, knowledge discovery and representation, classification and prediction models.

Introduction to Computer Systems Performance Evaluation (CEN 4400) 3 credits
Prerequisite: COP 3014, 3014L, and STA 4821
Principles of the quantitative evaluation techniques for computer system hardware and software, emphasizing the establishment and analysis of performance criteria. Deterministic and stochastic methods will be discussed.

Introduction to Database Structures (COP 3540) 3 credits
Prerequisite: COP 3530
An introduction to the design, implementation and use of file managers and relational data base systems. Topics include secondary storage devices, hash and indexed file structures, and the relational data base language SQL. Programming assignments will be done in the C language and in SQL.

Applied Database Systems (COP 4703) 3 credits
Prerequisite: COP 3540
Investigation of state-of-the-art facilities provided by object-relational database systems using Oracle as a vehicle. Java and the Java database interface, JDBC, are considered. Also, server-side web programming with dynamic SQL and CGI, PL/SQL, Java servlets, and JavaServer Pages (JSP) are considered. No prior knowledge of Java or web programming is assumed.

Python Programming (COP 4045) 3 credits
Prerequisite: COP 3530 with minimum grade of "C"
This course is an introduction to the Python programming language with applications to practical problem solving involving data manipulation and analysis. The first part of the course focuses on teaching the basics of the Python language. Topics covered are data structures (lists, arrays, dictionaries, sets, comprehensions), functions, files and object-oriented language elements. In the second part of the course, students learn to apply advanced language features and methodologies in combination with third-party libraries for scientific computation to develop real-world applications.

Introduction to Internet Computing (COP 3813) 3 credits
Prerequisite: COP 3014
This course teaches students how to design web pages and develop websites at the introductory to intermediate level. The course is project oriented. Students are required to finish several Internet-based projects using the tools introduced in class.

Introduction to Business Analytics and Big Data (ISM 3116) 3 credits
Prerequisite: ISM 3011 or ACG 4401
Provides an understanding of the business intelligence processes and techniques used in transforming data to knowledge and value in organizations. Students also develop skills to analyze data using generally available tools (e.g., Excel).

Business Communication for Data Analysts (GEB 3231) 3 credits
Prerequisites: Junior standing, admission to College of Business, and ISM 3116
This course introduces students to essential communication skills used by successful data analysts: interpersonal/team membership, concise business and technical writing, confident speaking, effective organizational strategies, critical thinking/analysis, appropriate technical language and formats, and productive job-search approaches within the MIS field. This course builds on analysis of data in ISM 3116 to show how it can be communicated effectively to audiences both within and outside the MIS field.

Data Mining and Predictive Analytics (ISM 4117) 3 credits
Prerequisite: None
Introduces the core concepts of data mining (DM), its techniques, implementation and benefits. Also identifies industry branches that most benefit from DM, such as retail, target marketing, fraud protection, health care and science and web and e-commerce. Detailed case studies and using leading mining tools on real data are presented.

Advanced Business Analytics (ISM 4403) 3 credits
Prerequisite: ISM 3116
An in-depth examination of business analytics methods of visualization, data mining, text mining and web mining using various analytical tools. Applications to smaller firms are investigated in a laboratory setting.

Contemporary Issues of Digital Data Management (ISM 4041) 3 credits

Prerequisite: None
Covers business processes and frameworks for data collection, storage, retrieval and transfer of digital data. Discusses the various ways through which industry and government compile data for purposes such as marketing, customer relationship management, fraud and crime prevention, e-government, etc. Considers also the business, legal, ethical and social context of data gathering and utilization.

Management of Information Assurance and Security (ISM 4323) 3 credits
Prerequisite: None
Emphasizes information security policy development, security management planning, risk assessment and risk management, disaster recovery and business continuity, and personnel issues related to security management.

Database Management Systems (ISM 4212) 3 credits
Prerequisite: ISM 3011 or ACG 4401
Focuses on the development of well-formed databases for the purpose of data management from the initial design of the database to the implementation and query and to the application of database management tools and techniques such as data security for use in business and government organizations.

Social Media and Web Analytics (ISM 4420) 3 credits
Prerequisite: None
Covers concepts and techniques for retrieving, exploring, visualizing and analyzing social network and social media data, website usage and clickstream data. Students learn to use key metrics to assess goals and return on investment, perform social network analysis to identify important social actors, subgroups and network properties in social media.

Business Analytics for Marketing and Customer Relationship Management (MAR 4615) 3 credits
Prerequisite: This course is open to students in the Bachelor of Business Administration or Bachelor of Science in Data Science and Analytics. MAR 3023 or permission of the instructor.
In this course, students will learn about customer databases, statistical tools for analyzing customer data, implementation of selective tools in data spreadsheets, and application of generated knowledge for marketing, especially customer management, decisions.

Revenue Management and Predictive Analytics in the Hospitality and Tourism (HFT 4881) 3 credits
Prerequisites: None
Exploration of revenue management, big data, and predictive analytics within the hospitality and tourism industry. The course will use a viewpoint of firm value and overall contribution to financial performance. Students will identify direct links between big data and firm performance while utilizing strategic management, prediction, and forecasting. A variety of data sources will be examined. Through analysis, students will learn to manage firms using an analytic culture that turns information into insight.

Additional Unrestricted Electives:

Spatial Data Analysis (GEO 4167C) 3 credits
Prerequisite: GEO 4022
Designed to help geographers, geologists, earth scientists, and other professionals explore a range of spatial analytical techniques. The emphasis is on the choice and application methods for the analysis of the various types of spatial data that are commonly encountered and analyzed in geographic information systems.

Photogrammetry and Aerial Photograph Interpretation (GIS 4021C) 3 credits
Prerequisites: None
Principles of aerial photography and photogrammetry including the photographic production process, electromagnetic principles, history of aerial photography and aerial platforms, elements of visual image interpretation, and analog and digital (soft copy) photogrammetric methods.

Geospatial Databases (GIS 4118) 3 credits
Prerequisite: GIS 4043C
Geospatial databases provide the functions of storing, managing and querying geospatial data and are essential components of Geographical Information Systems (GIS). This course covers the fundamental principles, techniques and methodologies for designing and implementing a geospatial database and querying and geoprocessing in geospatial databases**.**

Applications in Geographic Information Systems (GIS 4048C) 3 credits
Prerequisite: GIS 4043C or equivalent
Advanced technical, implementation and application issues in geographic information systems. Geocoding, algorithms for 2- and 3-dimensional representations, and system planning and implementation issues.

Computational Physics (PHZ 3151C) 4 credits
Prerequisites: MAC 2313, PHY 3101C
The course covers selected topics in numerical computation and computer-assisted analysis, with applications to physical systems.

Solar System Astronomy (AST 3110) 3 credits
Prerequisites: AST 2002 and PHY 2053
An intermediate, interdisciplinary course on the nature and dynamics of the solar system through applications of physics, atmospheric science, chemistry and geology. The course expands students' understanding of the different bodies in the solar system, of the fundamental principles of Earth processes to explain/predict processes on other bodies in or outside the solar system and to help them to consider the bodies for future exploration.

Mathematical Methods for Physics (PHZ 4113) 4 credits
Prerequisite: MAP 3305
This course develops applied mathematics for the physical sciences. It introduces integral transform, Green's function and orthogonal function expansion methods for solving differential equations. It also examines selected advanced topics, such as complex variables.

Practical Cell Neuroscience (PCB 4843C) 3 credits
Prerequisites: PCB 3063 with minimum grade of "B-"
This course focuses on understanding neurophysiological signaling at the cellular level. It looks at signaling from the perspective of single ion channels to cellular synaptic transmission. Students learn through both theory and practical laboratory experiments and apply these principles in an experimental proposal that they present and execute, resulting in a final report.

Laboratory Methods in Biotechnology (BSC 4403L) 3 credits
Prerequisites: MCB 3020, MCB 3020L, BCH 3033 and PCB 3063
Course offers hands-on experience in some of the basic and essential lab skills required in molecular biology and biotechnology that are directly transferable to the workplace. Concepts behind designing and implementing controlled experiments involving manipulation of DNA, RNA and protein are discussed.

Epidemiology of Infectious Diseases (MCB 4276) 3 credits
Prerequisites: None
This course examines the basic principles of epidemiology in the context of infectious diseases. Topics include the distribution and determinants of disease. Case studies from current literature supplement textbook material. The course places a strong emphasis on quantitative aspects of the field, including experimental design and basic statistics.

Concepts in Bioinformatics (BSC 4434C) 3 credits
Prerequisites: PCB 3063; open to students in Biology, Bioengineering, Science/Engineering and Computer Science
The course outlines concepts underlying the mining of the human genome, blending biology, medicine and engineering.

RI: Research Methods in Political Science (POS 3703) 3 credits
Introduction to the scope and methodology of political analysis. Includes introductory examinations of research design, survey research, computer applications, data analysis, and library research. (Course should be completed by the end of second semester of junior year.) This is a research-intensive (RI) course.

Public Opinion and American Politics (POS 4204) 3 credits
Prerequisite: POS 2041 with minimum grade of "C"
Political beliefs, values and attitudes of the American public; mass participation in public affairs; voting behavior; compliance and support for public policies. Linkages between the mass public and government in the United States.

Sociological Analysis: Quantitative Methods (SYA 4400) 3 credits
Design and execution of original research on social class, race, ethnicity, gender, and other issues central to contemporary sociology. Students explore various quantitative techniques using the Statistical Package for the Social Sciences (SPSS) and national survey and census data.

Research Methods in Bioarchaeology (ANT 4192) 3 credits
Prerequisite: ANT 4141, ANT 4514 or permission of instructor
Training in the research methodology of biological anthropology and archaeology. Application to an original research project and the presentation of a written research report.

Information Technology in Public Administration (PAD 3712) 3 credits
Provides a basic introduction to public sector information technology and e-governance. Topics include: computer software and

network basics, information infrastructures (their structures, characteristics, applications and policy aspects), implications for government functioning and interactions with the public.

Introduction to the Nonprofit Sector (PAD 4144) 3 credits
This is a multidisciplinary course examining the historical, political, legal, ethical and societal environments in which nonprofit organizations operate. This primarily includes institutions involved with education, social services, health care, and the arts. The course is intended for students who are seeking to enter the nonprofit field and those who have considerable experience working in nonprofits.

Research Methods for Public Management (PAD 4704) 3 credits
The course describes research practices used in the public sector by introducing methodologies, techniques, and decision tools. Areas of study include the research process, sampling procedures, research design, measurement, primary and secondary data, and the collection and analysis of data. In addition, computer applications and presentation of research reports (oral and written) are covered.

Quantitative Inquiry for Public Managers (PAD 4702) 3 credits
Prerequisite: STA 2023
This course introduces students to basic statistical concepts and quantitative methods of inquiry in public management using relevant examples and applications. Successful students should be able to apply statistical concepts and techniques toward effective decision making and evaluation of a wide variety of information.

Criminal Justice Technology (CJE 3692C) 3 credits
Lab course that includes an overview and application of computer hardware and software with criminal justice data for criminal justice purposes. Course also includes discussion of concepts and practice as well as helps prepare students for the criminal justice workplace environment.

Crime Analysis (CJE 4663) 3 credits
An introduction to crime analysis and crime mapping, this course examines types of techniques used to study crime and disorder patterns and problems in law enforcement today. It covers the theory, data collection methods, and statistics used as well as the history of career opportunities for crime analysis.

Computer Crime (CJE 4668) 3 credits
This course provides an overview of computer crime from a criminal justice perspective. It also examines computer crime prevention, computer security, legal and social issues, and modern investigative methodologies.

Teen Technology Misuse (CCJ 4554) 3 credits
Twenty-first century teens have employed communications technology to mistreat, embarrass, harass, control, threaten or abuse others. This includes, but is not limited to, cyber bullying, sexting, the criminal use of Facebook, electronic dating violence, predation and stalking. Students learn of the sociological, criminological, developmental and practical implications of this problem and how it can be addressed**.**

Methods of Research in Criminal Justice (CCJ 4700) 3 credits
Prerequisite: STA 2023
A study of the purpose of research, the logic of scientific inquiry and research techniques in criminal justice.

Research Methods in Social Work (SOW 4403) 3 credits
Prerequisite: SOW 3302
Introduction to the principles and methods of basic social work research, ethical conduct of research within the context of social work purposes and values. Formulation of problems for study that address the social needs of diverse population groups.

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and indicate whether any industry advisory council exists to provide input for curriculum development and student assessment.

As stated in Section I.B., FAU faculty have strong connections with local industry and businesses through an annual Data Science and Analytics Conference as well as other conferences and partnerships. At the 2018 Data Science and Analytics Conference, a special session was held to discuss with local business and industry representatives the skills and competencies that they expect from data scientists hired in their companies and that they would like to see represented

in the curricula for degree programs to hire graduates from FAU. Further interactions and discussions occurred at the 2019 conference and in other venues.

The steering committee for the development of this degree will recruit an advisory board to help ensure that the program is delivering the appropriate skill sets and to potentially enhance the capstone experience with projects and experiences from business, industry, and government, cf. I.B.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

No special accreditation will be sought.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

Not Applicable.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2 in Appendix A. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The program will be delivered via a mixture of traditional and online courses at the main campus in Boca Raton but also through courses possibly offered at branch campuses, particularly the Jupiter campus. There are already undergraduate students working on data science research projects on the Jupiter campus in connection with the Max Planck Florida Institute for Neuroscience. This connection may be fruitful for capstone research in the program and/or internships for students in the program. There is some potential for future collaboration with the FAU Honors College located on the Jupiter campus for some data science and related courses, and there have been exploratory discussions.

IX. Faculty Participation

A. Use Table 4 in Appendix A to identify existing and anticipated full-time (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

Table 4 in Appendix A lists all full-time faculty associated with the program in Year 1 through Year 5. The following scale is used for estimation in Table 4:

- One faculty member teaching one section of a course primarily for this program, such as teaching one of the common core courses, is projected to be 12.5% annual effort.
- One faculty member teaching one section of an existing course with reallocation of seats from other programs to the proposed program is projected to be 6.25% annual effort.
- One faculty member supervising one capstone project/thesis is projected to be 3.75% annual effort.
- One faculty member administrating a concentration in the program is projected to be 1% annual effort.

B. Use Table 2 in Appendix A to display the costs and associated funding resources for existing and anticipated full-time faculty (as identified in Table 4 in Appendix A). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

The total cost of faculty salaries and benefits in Year 1 from Table 2 is estimated to be $355,098 all of which is reallocation of current funds. The total cost of faculty salaries and benefits in Year 5 is estimated to be $763,665 of which $408,567 are new funds based on enrollment growth. OPS for three adjunct faculty at 6% annual effort in Year 1 is $405 and 22% annual effort in Year 5 is $990.

C. Provide in the appendices the abbreviated curriculum vitae (CV) for each existing faculty member (do not include information for visiting or adjunct faculty).

See Appendix M for all abbreviated CV's.

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

The Department of Mathematical Sciences had in Fiscal Year 2015 a total of 7 proposals awarded, corresponding to $202,259 in extramural funding, whereas for Fiscal Year 2019, an award amount of $1,275,072 (16 awards) can be reported, showing a strong upward trend in funded research. Faculty at the department is supported through the Army Research Laboratory, DARPA, Cyber Florida, the German Federal Office for Information Security, NATO SPS, NIH, NIST, NSF, and NSA. In addition to publishing research papers, faculty is active in writing textbooks --- in 2015 a textbook in cryptography (CRC Press) appeared, in 2017 in algebra (AMS), in 2018 in analysis (AMS), and in 2019, a volume on "50 years of combinatorics, graph theory and computing" (CRC Press) has been co-edited by a faculty member. In addition, several volumes of Springer's Lecture Notes in Computer Science series have been co-edited by departmental faculty, including volumes 10786 (2018), 11505 (2019), and 11666 (2019).

Through its cryptography group, the department is actively involved in a federal standardization process in the area of data security --- three of 26 Round 2 candidates in NIST's ongoing post-quantum standardization effort are co-authored by a department member. For a research project in the area of data security, one of the faculty members received the 2018 NATO Science for Peace and Security Partnership Prize. The department routinely hosts large international scientific meetings in various areas, including, e.g., the 9th International Conference on Post-Quantum Cryptography in 2018, the 5th International Conference on Computational and

Mathematical Population Dynamics in 2019, and -- this year for the 51st time -- the Southeastern International Conference on Combinatorics, Graph Theory and Computing.

Through its service courses, the department serves a large number of students per year – for Academic Year 2018/2019, about 33,000 student contact hours can be reported. For its own majors, undergraduate as well as graduate degrees are offered, including a Ph.D. program, which in 2018 and in 2019 graduated six students in per year, moving on to academia, government, and industry. For incoming students, the department offers support through various student chapters of professional organizations (AMS, AWM, SIAM) -- the AWM student chapter received both in 2018 and in 2019 the Association of Women in Mathematics' Fundraising and Sustainability Award.

The CEECS Department has over 800 undergraduate, 200 M.S. and 75 Ph.D. students. Its three programs (Electrical Engineering, Computer Engineering and Computer Science) are all accredited by the American Board of Engineering Training (ABET) and Southern Association of Colleges and Schools (SACS). The 5-year trend of degrees awarded and 6-year trend of external research expenditures are shown in the tables below.

	2014-15	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Bachelor's	171	226	225	232	239
Master's	59	41	54	85	69
PhD	16	5	7	14	11
Total	**246**	**272**	**286**	**331**	**319**

Total Departmental Research Expenditure

FY2013-14	**FY2014-15**	**FY2015-16**	**FY2016-17**	**FY2017-18**	**FY2018-19**
867,727	850,795	1,457,057	2,370,294	2,463,447	3,969,952

The CEECS Department is home to two NSF IUCRC (Industry – University Cooperative Research Centers), two named laboratories (Bidtellect and Tecore). In AY 2018-19, CEECS faculty have published 5 books, 229 peer reviewed publications and submitted 34 grant proposals.

The ITOM Department has over 230 undergraduate, and 53 M.S. students. Its programs, BBA/BS in MIS and MS in ITM, are all accredited by the AACSB and Southern Association of Colleges and Schools (SACS). The 5-year trend of degrees awarded are shown the table below.

	2014-15	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Bachelor's	83	88	102	111	102
Master's	8	11	10	24	18
Total	**91**	**99**	**112**	**135**	**120**

In the AY 2018-19, the ITOM Department faculty have published 2 books, 23 peer reviewed publications, 16 conference presentations.

The Political Science department currently serves over 500 undergraduate majors and 28 M.A students. In addition, it is a key department in the launch of the new Culture, Society and Politics track of the College of Arts and Letters PhD program in Comparative Studies and houses the Data and Society Concentration for the MS in Data Science and Analytics degree. In addition to this,

the Political Science department offers two key courses within the university's Intellectual Foundations Program, INR 2002 World Politics and POS 2041 Government of the United States, and delivers these to roughly 1400 students a year. Between 2014 and 2018 the department produced 8 monographs, 54 journal articles, 34 other scholarly publications, and 114 conference presentations. The degree trends for the department are shown in the table below.

	2013-14	2014-15	2015-16	2016-17	2017-18
Bachelor's	126	138	121	120	124
Master's	13	11	10	9	12
Total	**139**	**149**	**131**	**129**	**136**

The School of Criminology and Criminal Justice has over 1500 active majors and over 40 M.S. students. Our programs are accredited by the Southern Association of Colleges and Schools (SACS). The 5-year trend of degrees awarded are shown in the table below.

	2014-15	2015-16	2016-17	2017-18	2018-19
Bachelor's	370	381	332	280	322
Master's	28	20	35	33	12
Total	**398**	**401**	**367**	**313**	**334**

In the AY 2018-19, the SCCJ faculty have published 2 books, 24 peer reviewed publications, over 20 conference or other professional presentations.

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved.

All FAU campuses have onsite libraries, with extensive physical and electronic collections. The print volume count for books that could be categorized as Data Science and Analytics totals 18,483 plus an additional 6,217 unique e-book titles. The number of print and electronic serials subscribed includes 0 print journals and 813 unique electronic journals.

The libraries also have access to a number of journal titles through aggregator databases such as JSTOR, ProQuest or Academic Search Premier. A list of journal titles related to Data Science and Analytics in excel file (DataRelatedJournals.xls) and a list of aggregator databases such as JSTOR, ProQuest or Academic Search Premier in excel file (RelatedDatabases.xls) are attached. (Please see second attached file.)

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 2 in Appendix A. Please include the signature of the Library Director in Appendix B.

No additional resources are being requested, as the needed materials are already in place.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program

through Year 5.

The existing space at each of the sites participating in the program is sufficient to meet the needs of both teaching and undergraduate research opportunities. There are sufficiently many computer labs and computer classrooms to support the program. Specialized facilities and research areas are described below.

Center for Cryptology and Information Security (CCIS)
The CCIS was established in the Fall of 2003 as a FAU College of Science center with funding provided by a Federal Earmark, and is by now founded on the unique strengths of cryptology and information security specialists in four different colleges of FAU, three of which are part of this proposal. The center seeks and promotes collaboration with information technology industries of our region, and with federal and state government departments in the areas of information security. In July 2016, FAU and the Airforce Research Laboratory, Information Directorate, Rome, New York, US (AFRL/RI) have entered into an Education Partnership Agreement for a period of 5 years. AFRL/RI is recognized as a national asset and leader in Communications, Computing, Cyber, and Intelligence technologies. This agreement will provide a unique opportunity for collaborative research and development. CCIS enabled FAU to be recognized as a National Center of Academic Excellence in Information Assurance/Cyber Defense Research (CAE-R) for academic years 2014-2019.

The mission of the Center is to promote and advance the state of knowledge, methodology, and training in information security. This faculty will bring the required expertise in securing data in rest and motion to the proposed degree program.

NSF Big Data Lab
This lab, procuring and acquiring a large computing cluster appropriate for Big Data research, aims to enable research in a number of fields of national concern such as bioinformatics, ocean energy, social media mining, environmental and climate modeling, image processing and analysis emergency response, health and medical informatics, national security, infrastructure maintenance and reliability, law enforcement, commerce, and manufacturing. All these demand the advanced computation resources under this acquisition. The study of Big Data encompasses the analysis of extremely large datasets, building models which are able to incorporate vast numbers of instances and features in order to make reliable predictions and connections.

Maintaining and promoting the growth of Big Data has become an essential activity to ensure that the problems that now seem insurmountable may be solved tomorrow. Two aspects of this growth are developing and providing courses for students focused on the tools and techniques necessary for Big Data research, and more focused training in these tools for existing researchers whose area of expertise lies in other aspects of research. Best practices will be followed for cultural diversity, involving students and researchers from underrepresented groups.

Bidtellect Laboratory
The Bidtellect Laboratory is an incubator to support big data analytics and digital advertising research, as well as serve as an educational platform. Bidtellect's proprietary state of the art technology allows native ad planning, buying, selling and overall management on a single platform. By utilizing Bidtellect's Native DSP (nDSP), Native SSP (nSSP) and openRTB 2.3 Native

Exchange, advertisers and publishers can now implement effective Native campaigns at scale with maximum optimization and ROI.

Rubin and Cindy Gruber Sandbox resource center
Through a $1 million gift from Rubin and Cindy Gruber, a 3400 square feet of library space is being renovated into a resource center to enable students from all disciplines to engage with tools and methods of artificial intelligence and data science to solve problems.

The ITOM Department
Classroom and teaching laboratory space are located in the Fleming Hall and Business BU building, with state of the art Trading Room and Lecture Capture rooms permitting distance learning between FAU campuses from some classrooms. No additional teaching space is required to implement the proposed BS-DSA degree program- Data Science and Business Concentration. Major research areas of ITOM include Information Security, Social Media and Big Data, Global Sourcing and Virtual Teams, Privacy and Social implications of information security and Big Data, Healthcare analytics, Supply Chain Management, Supply chain security and analytics, Operations Management, Information technology adoption by individuals and organizations, IT organizational policies and practices.

The Political Science Department
The College of Arts and Letters boast an Advanced Media Production lab that includes an array of computer equipment that we anticipate using to support this initiative. As a teaching space with embedded technology capable of being used to support the program goals, we anticipate that this will be a primary space for delivery of curriculum by Arts and Letters faculty as it relates to the BS in Data Science and Analytics degree. In addition, the college is currently seeking external grant funding in order to expand the Advanced Media Production labs capacities, transforming it into a Digital Humanities Lab that will include even more instructional and technological capacity than is currently enjoyed in the existing lab. If we are successful in securing external funding for the expanded lab, we will use this space to deliver instruction, as well.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2 in Appendix A. Do not include costs for new construction because that information should be provided in response to X (E) below.

No additional space will be required.

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

No new capital expenditures will be required.

F. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

Sufficient computer equipment is available in existing labs and classrooms. FAU currently runs

several High Performance Computer Clusters that allow faculty and students in investigate numerous different problem sets.

G. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2 in Appendix A.

We anticipate only some expenses on marketing the new program, software renewals, and replacement of equipment over the time. Hence we budget at $5,000 on the first year and with new enrollment growth expenses of $10,000 by Year 5.

H. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2 in Appendix A.

No special resources are anticipated.

I. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2 in Appendix A.

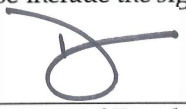
No fellowships or scholarships specific to this degree program are anticipated.

J. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

As described in Sections I.B., II.A., and VIII.F., FAU faculty have many local industry contacts, some of whom are willing to partner with us to provide internship sites and support for the capstone requirement in this degree program. Recently there have internships with NCCI, JM Family, Citrix, Goldman Sachs, American Express, Nexis and Lexis, Oak Ridge National Lab, and Office Depot.

APPENDIX B

Please include the signature of the Equal Opportunity Officer and the Library Director.



Signature of Equal Opportunity Officer	**Date** 2/21/2020
Carol Atkinson **Signature of Library Director**	1/21/20 **Date**

This appendix was created to facilitate the collection of signatures in support of the proposal. Signatures in this section illustrate that the Equal Opportunity Officer has reviewed section II.E of the proposal and the Library Director has reviewed sections X.A and X.B.

APPENDIX A

TABLE 1-A
PROJECTED HEADCOUNT FROM POTENTIAL SOURCES
(Baccalaureate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	9	7	12	9	6	5	4	3	2	2
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	10	7	16	12	20	15	24	18	28	21
Florida College System transfers to the upper level***	9	7	10	7	16	12	20	15	24	18
Transfers to the upper level from other Florida colleges and universities***	1	1	1	1	4	3	6	5	8	6
Transfers from out of state colleges and universities***	1	1	1	1	4	3	6	4	8	6
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**30**	**23**	**40**	**30**	**50**	**38**	**60**	**45**	**70**	**53**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.

** If numbers appear in this category, they should go DOWN in later years.

*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1 Funding Source								Year 5 Funding Source						
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 1+…+7**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 9+…+ 14**
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits	355,098	0	0	0	0	0	0	**$355,098**	355,098	408,567	0	0	0	0	**$763,665**
A & P Salaries and Benefits	30,000	0	0	0	0	0	0	**$30,000**	30,000	60,000	0	0	0	0	**$90,000**
USPS Salaries and Benefits	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Other Personal Services	405	0	0	0	0	0	0	**$405**	405	585	0	0	0	0	**$990**
Assistantships & Fellowships	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Library	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Expenses	5,000	0	0	0	0	0	0	**$5,000**	5,000	10,000	0	0	0	0	**$15,000**
Operating Capital Outlay	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Total Costs	**$390,503**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$390,503**	**$390,503**	**$479,152**	**$0**	**$0**	**$0**	**$0**	**$869,655**

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base," "enrollment growth," and "new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	2.74	5.99
A & P (FTE)	0	0
USPS (FTE)	0	0

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$390,503	$869,655
Annual Student FTE	23	53
E&G Cost per FTE	$16,978	$16,409

Table 2 Column Explanations

Reallocated Base* (E&G)	1	E&G funds that are already available in the university's budget and will be reallocated to support the new program. Please include these funds in the Table 3 – Anticipated reallocation of E&G funds and indicate their source.

Enrollment Growth (E&G)	2	Additional E&G funds allocated from the tuition and fees trust fund contingent on enrollment increases.
New Recurring (E&G)	3	Recurring funds appropriated by the Legislature to support implementation of the program.
New Non-Recurring (E&G)	4	Non-recurring funds appropriated by the Legislature to support implementation of the program. Please provide an explanation of the source of these funds in the budget section (section III. A.) of the proposal. These funds can include initial investments, such as infrastructure.
Contracts & Grants (C&G)	5	Contracts and grants funding available for the program.
Philanthropy Endowments	6	Funds provided through the foundation or other Direct Support Organizations (DSO) to support of the program.
Enterprise Auxiliary Funds	7	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 1+…+7	8	Subtotal of values included in columns 1 through 7.
Continuing Base** (E&G)	9	Includes the sum of columns 1, 2, and 3 over time.
New Enrollment Growth (E&G)	10	See explanation provided for column 2.
Other*** (E&G)	11	These are specific funds provided by the Legislature to support implementation of the program.
Contracts & Grants (C&G)	12	See explanation provided for column 5.
Philanthropy Endowments	13	See explanation provided for column 6.
Enterprise Auxiliary Funds	14	Use this column for continuing education or market rate programs and provide a rationale in section III.B. in support of the selected tuition model.
Subtotal coulumns 9+…+ 14	15	Subtotal of values included in columns 9 through 14.

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
Mathematical Sciences faculty, staff, and expense in this program	2,577,309	112,931	**$2,464,378**
Computer Science faculty, staff, and expense in this program	1,859,489	97,493	**$1,761,997**
ITOM faculty, staff, and expense in this program	1,185,238	81,152	**$1,104,087**
Arts & Letters faculty, staff, and expense in this program	626,117	49,046	**$577,071**
CDSI faculty, staff, and expense in this program	626,839	49,882	**$576,958**
Totals	$6,874,994	$390,503	**$6,484,491**

*** If not reallocating funds, please submit a zeroed Table 3**

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5	Salary	Benefits	Salary + Benefits	PY Year 1 Budget	PY Year 5 Budget
A	Abraha, Yonas, Ph.D. Statistics	Instructor	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.16	0.12	45,900.00	13,770.00	59,670.00	2,797.03	6,994.82
A	Bai, Shi, Ph.D. Mathematics	Asst. Prof.	Tenure-earning	Fall 2020	9	0.75	0.13	0.09	9	0.75	0.16	0.12	78,030.00	23,409.00	101,439.00	9,509.91	11,891.19
A	Booton, Barry, Ph.D. Mathematics	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	62,829.54	18,848.86	81,678.40	3,828.68	3,828.68
A	Chang, Lun-Ching, Ph.D Statistics	Asst. Prof.	Tenure-earning	Fall 2020	9	0.75	0.14	0.10	9	0.75	0.29	0.22	78,030.00	23,409.00	101,439.00	10,270.70	22,161.89
A	Escuder, Ana, Ph.D. Curriculum and Instruction	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	56,482.83	16,944.85	73,427.68	3,441.92	3,441.92
A	Hahn, William, Ph.D. Complex Systems	Asst. Prof.	Tenure-earning	Fall 2020	9	0.75	0.13	0.09	9	0.75	0.28	0.21	66,300.00	19,890.00	86,190.00	8,080.31	18,183.94
A	Hoffman, Fredrick, Ph.D Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	108,931.23	32,679.37	141,610.60	6,638.00	6,638.00
A	Kalies, William, Ph.D. Mathematics	Professor	Tenured	Fall 2020	12	1.00	0.00	0.00	12	1.00	0.16	0.16	140,612.51	42,183.75	182,796.26	0.00	28,571.06
A	Karabina, Koray, Ph.D. Mathematics	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.16	0.12	100,583.22	30,174.97	130,758.19	6,129.29	15,328.13
A	Locke, Stephen, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.09	0.07	107,811.16	32,343.35	140,154.51	6,569.74	9,859.87
A	Long, Hongwei, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.09	0.07	92,343.30	27,702.99	120,046.29	5,627.17	8,445.26
A	Lundberg, Erik, Ph.D. Mathematics	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.16	0.12	88,079.74	26,423.92	114,503.66	5,367.36	13,422.69
A	Magliveras, Spyros, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	157,733.71	47,320.11	205,053.82	9,611.90	9,611.90
A	Meyerowitz, Aaron, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.00	0.00	9	0.75	0.06	0.05	84,290.37	25,287.17	109,577.74	0.00	5,136.46
A	Mireles-James, Jason, Ph.D. Mathematics	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.09	0.07	84,460.03	25,338.01	109,798.04	5,146.78	7,724.29
A	Moosai, Susan, Ph.D. Education Leadership / Higher Ed.	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	62,938.51	18,881.55	81,820.06	3,835.32	7,670.63
A	Motta, Francis, Ph.D. Mathematics	Asst. Prof.	Tenure-earning	Fall 2020	9	0.75	0.13	0.09	9	0.75	0.28	0.21	76,500.00	22,950.00	99,450.00	9,323.44	20,981.46
A	Naudot, Vincent, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.00	0.00	9	0.75	0.03	0.02	91,439.94	27,431.98	118,871.92	0.00	2,790.52
A	Pina, Philip, M.S. Mathematics	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.16	0.12	58,792.77	17,637.83	76,430.60	3,582.68	8,959.58
A	Radulovic, Dragan, Ph.D. Mathematics	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	101,270.15	30,381.05	131,651.20	6,171.15	12,342.30
A	Steinwandt, Rainer, Ph.D. Computer Science	Professor	Tenured	Fall 2020	12	1.00	0.00	0.00	12	1.00	0.09	0.09	141,781.70	42,534.51	184,316.21	0.00	17,288.86
A	Tuncer, Necibe, Ph.D. Mathematics	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.00	0.00	9	0.75	0.09	0.07	97,404.83	29,221.45	126,626.28	0.00	8,908.16
A	Khoshgoftaar, Taghi, Ph.D. Computer Science	Professor	Tenured	Fall 2020	9	0.75	0.13	0.09	9	0.75	0.25	0.19	135,232.41	40,569.72	175,802.13	16,481.45	32,962.90
A	Zhu, Xingquan (Hill), Ph.D. Computer Science	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.19	0.14	115,737.98	34,721.39	150,459.37	7,052.78	21,158.35
A	Wang, Dingding, Ph.D. Computer Science	Assist. Prof.	Tenure-earning	Fall 2021	9	0.75	0.00	0.00	9	0.75	0.19	0.14	95,772.36	28,731.71	124,504.07	0.00	17,508.38
A	Bullard, Lolton, Ph.D. Computer Science	Instructor	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	104,538.90	31,361.67	135,900.57	6,370.34	12,740.68
A	Sorgente, Tami, M.S. Computer Science	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	66,846.31	20,053.89	86,900.20	4,073.45	8,146.89
A	DeGiorgio, Michael,Ph.D. Computer Science	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.13	0.09	9	0.75	0.25	0.19	120,000.00	36,000.00	156,000.00	14,625.00	29,250.00
A	Assis, Raquel, Ph.D. Bioinformatics	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	110,000.00	33,000.00	143,000.00	6,703.13	13,406.25
A	Nojoumian, Mehrdad, Ph.D. Computer Science	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.16	95,397.34	28,619.20	124,016.54	5,813.28	20,346.46
A	Cardei, Ionut, Ph.D. Computer Science	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.16	0.12	115,390.22	34,617.07	150,007.29	7,031.59	17,578.98
A	Marques, Oge, Ph.D. Computer Science	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.19	0.14	131,166.79	39,350.04	170,516.83	7,992.98	23,978.93
A	Yang, KwangSoo, Ph.D. Computer Science	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.09	93,756.59	28,126.98	121,883.57	5,713.29	11,426.58
A	Kalva, Hari,Ph.D. Computer Science	Professor	Tenured	Fall 2020	9	0.75	0.01	0.01	9	0.75	0.07	0.05	124,797.70	37,439.31	162,237.01	1,216.78	8,821.64
A	Ghoraani, Behnaz, Ph.D. Electrical Engineering	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.16	121,739.81	36,521.94	158,261.75	7,418.52	25,964.82
A	Goo, Jahyun, Ph.D. ITOM	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.10	137,965.43	41,389.63	179,355.06	8,070.98	17,487.12
A	Conpomizzi, Joseph, Ph.D. Business Communications	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.10	59,117.96	17,735.39	76,853.35	3,458.40	7,493.20
A	Sharma, Bharti, Ph.D. ITOM	Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.13	0.10	9	0.75	0.19	0.14	72,828.00	21,848.40	94,676.40	9,230.95	13,491.39
A	Schindlbeck, Mary, Ph.D. ITOM	Sen. Instr.	Non-Tenure earning	Fall 2020	9	0.75	0.13	0.10	9	0.75	0.19	0.14	91,767.51	27,530.25	119,297.76	11,631.53	16,999.93
A	Behara, Ravi, Ph.D. ITOM	Professor	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	159,279.68	47,783.90	207,063.58	9,317.86	9,317.86
A	Huang, Derrick, Ph.D. ITOM	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.13	0.10	9	0.75	0.13	0.10	140,397.67	42,119.30	182,516.97	17,795.40	17,795.40
A	Javadinia, Amir, Ph.D. Marketing	Assist. Prof.	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	130,000.00	39,000.00	169,000.00	7,605.00	7,605.00
A	Bilgihan, Anil, Ph.D. Hospitality	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	120,365.59	36,109.68	156,475.27	7,041.39	7,041.39
A	Wagner, Kevin Political Science	Full Prof	Tenured	Fall 2020	12	1.00	0.13	0.13	12	1.00	0.13	0.13	133,373.16	40,011.95	173,385.11	21,673.14	22,540.06
A	Gurses, Mehmet Political Science	Full Prof	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.17	80,174.58	24,052.37	104,226.95	4,690.21	17,197.45
A	Duhkong, Kim Political Science	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.17	71,940.21	21,582.06	93,522.27	4,208.50	15,431.18
A	Nichols, Angela Political Science	Asst Prof	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.19	0.14	60,755.65	18,226.70	78,982.35	3,554.21	11,254.98
A	Harris, Michael Anthropology	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05	135,385.13	40,615.54	176,000.67	7,920.03	7,920.03
A	Gao, Liu Public Administration	Assoc. Prof.	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.17	89,244.00	26,773.20	116,017.20	5,220.77	19,142.84
A	Guastaferro, Wendy Criminology & Criminal Justice	Assoc. Prof.	Tenured	Fall 2020	12	1.00	0.13	0.13	12	1.00	0.19	0.19	137,200.00	41,160.00	178,360.00	22,295.00	33,888.40
A	Hinduja, Sameer Criminology & Criminal Justice	Full Prof	Tenured	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.22	0.17	105,763.00	31,728.90	137,491.90	6,187.14	22,686.16
A	Fallik, Seth Criminology & Criminal Justice	Asst Prof	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.19	0.14	70,417.00	21,125.10	91,542.10	4,119.39	12,815.89
A	Spadola, Christine Social Work	Asst Prof	Tenure-earning	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.13	0.10	79,560.00	23,868.00	103,428.00	4,654.26	10,084.23
	Total Person-Years (PY)							**2.74**				**5.99**				**$ 355,098.12**	**$ 763,664.96**

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1	Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	2.74	5.99
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00	0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.00	0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00	0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00	0.00
		Overall Totals for	**Year 1 2.74**	**Year 5 5.99**

Math Faculty: BASE, YEAR 1, REALLOC	2,577,309.46	105,931.37	112,931.37
CS Faculty: BASE, YEAR 1, REALLOC	1,859,489.33	90,492.58	97,492.58
ITOM Faculty:BASE, YEAR 1, REALLOC	1,185,238.39	74,151.51	81,151.51
A&L Faculty: BASE, YEAR 1, REALLOC	626,117.35	42,046.09	49,046.09