STATE UNIVERSITY SYSTEM OF FLORIDA

State University System of Florida Board of Governors

REQUEST TO OFFER A NEW DEGREE PROGRAM

In accordance with Board of Governors Regulation 8.011

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

Florida International University
Institution Submitting Proposal

Fall 2024
Proposed Implementation Term

Engineering and Computing
Name of College(s) or School(s)

Computing and Information Sciences
Name of Department(s)/Division(s)

Data Science
Academic Specialty or Field

Bachelor of Science in Data Science and Artificial Intelligence
Complete Name of Degree

30.7001
Proposed CIP Code (2020 CIP)

Proposed Program Type
☒ **E&G Program**
☐ **Market Tuition Rate Program**
☐ **Self-Supporting Program**

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 before the program's initiation.

Date Approved by the University Board of Trustees	**President's Signature** **Date**
Board of Trustees Chair'sDate Signature	**Provost's Signature** **Date**

Projected Enrollments and Program Costs

Provide headcount (HC) and full-time equivalent (FTE) student estimates for Years 1 through 5. HC and FTE estimates should be identical to those in Appendix A – Table 1. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Appendix A – Table 3A or 3B. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 by dividing the total E&G by FTE.

Implementation Timeframe	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary/ Philanthropy Funds	Total Cost
Year 1	30	24.6	$3,811	$93,743	$0	$0	$93,743
Year 2	68	56.4					
Year 3	94	70.6					
Year 4	107	89.6					
Year 5	150	130	$2,800	$364,012	$0	$0	$364,012

Programs of Strategic Emphasis Waiver *(for baccalaureate programs only)*

Does the program fall under one of the CIP codes listed below?

☐ **Yes**
☒ **No**

If yes, students in the program will be eligible for the Programs of Strategic Emphasis (PSE) waiver. See Board Regulation 7.008 and the PSE Waiver Guidance for additional details.

CIP CODE	CIP TITLE	CATEGORY
11.0101	Computer and Information Sciences	STEM
11.0103	Information Technology	STEM
14.0801	Civil Engineering	STEM
14.0901	Computer Engineering	STEM
14.1001	Electrical and Electronics Engineering	STEM
27.0101	Mathematics	STEM
40.0801	Physics	STEM
52.0301	Accounting	GAP ANALYSIS
52.0801	Finance	GAP ANALYSIS
52.1201	Management Information Systems	STEM

Additional Required Signatures – Equal Opportunity Officer

I confirm that I have reviewed and approved Need and Demand Section III.F. of this proposal.

9-26-23

Signature of Equal Opportunity Officer **Date**

Additional Required Signatures – Library Dean

I confirm that I have reviewed and approved Non-Faculty Resources Section IX.A. and IX.B. of this proposal.

DocuSigned by:
Jennifer Fu
16F828D74769460...

9/6/2023

Signature of Library Dean/Director **Date**

Introduction

I. Program Description and Relationship to System-Level Goals

A. Describe within a few paragraphs the proposed program under consideration and its overall purpose, including:

- **degree level(s)**
- **majors, concentrations, tracks, specializations, or areas of emphasis**
- **total number of credit hours**
- **possible career outcomes for each major (provide additional details on meeting workforce need in Section III)**

This is a 120-credit undergraduate degree Bachelor of Science in Data Science and Artificial Intelligence (DSAI). This degree merges the fields of computer science, statistics, and mathematics to train students in the cutting-edge techniques and tools essential for data-driven decision-making in a variety of industries.

The proposed Bachelor of Science in Data Science and Artificial Intelligence seeks to address the increasing demand for skilled data professionals. According to the US Bureau of Labor Statistics, there is a significant projected growth in this field of 36% between 2021-2031, much faster than the average for all occupations. The median annual wage for data scientists was $100,910 in May 2021. In 2021, the Data Science market size was estimated at USD 96.3 billion, and it is expected to hit approximately USD 378.7 billion by 2030 (compound annual growth rate (CAGR) of 16.43% over the forecast period 2022 to 2030). According to O*NET, in Florida, Data Scientists on average earn $100,520.

Currently, University of Central Florida, Florida Polytechnic University, and University of Florida offer a B.S. in Data Science, and University of South Florida offer Information Science B.S., with Data Science and Analytics Concentration.

The Bachelor of Science in Data Science and Artificial Intelligence program will comprise 120 credit hours which includes 3 possible concentrations: Computational and Big Data Analytics, Artificial Intelligence and Robotics, and Statistical Modeling. In addition to tremendous employment opportunities, this program would also feed into our MS in Data Science and MS in Computer Science degree programs. The related occupations of Data Scientists are Data Analyst, Data Engineering, Bioinformatics Scientists, Bioinformatics Technicians, Biostatisticians Business Intelligence Analysts, Clinical Data Managers, Financial Quantitative Analysts, Mathematicians, Operations Research Analysts, Statistical Assistants, and Statisticians.

B. If the proposed program qualifies as a Program of Strategic Emphasis, as described in the Florida Board of Governors 2025 System Strategic Plan, indicate the category.

- **Critical Workforce**
  - ☐ Education
  - ☐ Health
  - ☐ Gap Analysis
- **Economic Development**
  - ☐ Global Competitiveness
  - ☒ Science, Technology, Engineering, and Math (STEM)

☐ **Does not qualify as a Program of Strategic Emphasis.**

II. Strategic Plan Alignment, Projected Benefits, and Institutional Mission and Strength

A. Describe how the proposed program directly or indirectly supports the following:

- **System strategic planning goals (see the link to the 2025 System Strategic Plan on the New Program Proposals & Resources webpage)**

- **the institution's mission**
- **the institution's strategic plan**

The proposed Bachelor of Science in Data Science and Artificial Intelligence directly aligns with several System strategic planning goals. As stated in the 2025 System Strategic Plan: (i) Student Access and Success: Data science is a rapidly growing field, and by offering this program, we are ensuring that students have access to modern, relevant education that prepares them for the global workforce.

The curriculum is tailored to provide success by covering both foundational and advanced topics in data analytics, machine learning, and data visualization. (ii) Scholarship, Research, and Innovation: The interdisciplinary nature of data science means that faculty and students will engage in diverse research topics, fostering innovation. This supports goals related to research and development expenditures and undergraduate research engagement. (iii) Post-graduation Success: Given the demand for data scientists in almost every sector, graduates are likely to find employment quickly and earn competitive salaries, thus supporting goals related to graduates' employment and wage outcomes.

Our institution has always been dedicated to fostering innovation, academic excellence, and preparing students for global challenges. The Bachelor of Science in Data Science and Artificial Intelligence echoes this mission by offering rigorous training in a field that is quintessential for the digital age. By preparing students to derive insights from vast data sets and drive decision-making in various sectors, we're molding future leaders and thinkers.

The institution's strategic plan emphasizes creating future-ready programs, interdisciplinary learning, and fostering a culture of research and innovation. This program:

- Addresses the need for future-ready graduates by equipping them with skills in one of the 21st century's most sought-after domains.
- Embodies interdisciplinary learning, as data science encompasses elements of computer science, mathematics, domain-specific knowledge, and ethics.
- Encourages a culture of research, as students will actively engage in projects, capstone assignments, and potentially even partnerships with local industries.

B. Describe how the proposed program specifically relates to existing institutional strengths. This can include:

- **existing related academic programs**
- **existing programs of strategic emphasis**
- **institutes and centers**
- **other strengths of the institution**

Florida International University (FIU) already has robust school and departments in Computer Science, Mathematics, and Statistics, as well as programs focused on Information Technology and Business Analytics. Introducing a Bachelor of Science in Data Science and Artificial Intelligence allows FIU to bridge the knowledge from these existing departments and offer a comprehensive, interdisciplinary approach to Data Science. The expertise from faculty can serve as a solid foundation for the new curriculum, ensuring that students receive an education grounded in FIU's proven academic standards.

Moreover, FIU has always emphasized STEM (Science, Technology, Engineering, and Mathematics) disciplines as strategic areas of focus. Data Science, being at the intersection of technology, mathematics, and domain-specific expertise, aligns seamlessly with this emphasis. The university's commitment to producing STEM graduates means that there's already an infrastructure of support, resources, and a culture of innovation that will benefit students of this program.

FIU is also home to several research institutes and centers, many of which handle vast amounts of data. For instance, the Institute of Environment, the Center for Children and Families, and the Biomolecular Sciences Institute all deal with complex data sets in their research. The Data Science and Artificial Intelligence program can foster partnerships with these institutes, providing students with real-world datasets to practice on and enabling the institutes to gain insights from the university's budding data scientists.

Situated in Miami, FIU is at the crossroads of Latin America and the U.S., making it a hub for international business, tech start-ups, and trade. Data Science and Artificial Intelligence students can benefit from potential internships, job opportunities, and real-world projects with local industries. Furthermore, FIU has strong collaborations with universities and

industries worldwide. This global perspective is crucial in data science, a field that's inherently borderless, allowing for data-driven collaborations across countries.

C. Provide the date the pre-proposal was presented to the Council of Academic Vice Presidents Academic Program Coordination (CAVP ACG). Specify any concerns raised and provide a narrative explaining how each concern has been or will be addressed.

The CAVP ACG met on September 13th, 2023. There were no concerns raised.

D. In the table below provide an overview of the institutional planning and approval process leading up to the submission of this proposal to the Board office. Include a chronology of all activities, providing the names and positions of university personnel and external individuals who participated.

- **If the proposed program is at the bachelor's level, provide the date the program was entered into the APPRiSe system, and, if applicable, provide a narrative responding to any comments received through APPRiSe.**

- **If the proposed program is a doctoral-level program, provide the date(s) of the external consultant's review in the planning table. Include the external consultant's report and the institution's responses to the report as Appendix B.**

Table: Planning Process

Date	Participants	Planning Activity
Spring 2022	Gregory Murad Reis, KFSCIS Faculty, and Jason Liu, KFSCIS Director	Data Science and Artificial Intelligence degree development
Fall 2022	Gregory Murad Reis and Computer Science Undergraduate Program Committee (CS UPC)	Data Science and Artificial Intelligence degree development and discussions about the curriculum, coursework, and feasibility
March 2023	Gregory Murad Reis and KFSCIS Faculty	Initial presentation to KFSCIS Faculty Meeting
April 2023	Gregory Murad Reis and CS UPC	Coursework sequence approval
April 2023	Gregory Murad Reis and KFSCIS Faculty	Final presentation to KFSCIS Faculty Meeting
April 2023	Industry Advisory Board meeting with invited outside Computer Science experts brought to FIU for Capstone Showcase Presentation (Assurant, etc.)	Discussions concerning curriculum and coursework in Data Science and Artificial Intelligence
June 2023	Susan Himburg, Assoc. VP Academic Planning and Accountability (APA), Jennifer Doherty-Restrepo, Asst. VP, APA, Gregory Murad Reis, Jason Liu, Nagarajan Prabakar, Assoc. Professor and Undergraduate Program Director, and Mark Weiss, Assoc. Dean of Undergraduate Education at College of Engineering and Computing (CEC)	Discussions regarding BS in Data Science and Artificial Intelligence pre-proposal guidelines and timeline
Summer 2023	Susan Himburg, Gregory Murad Reis, Jason Liu, Trevor Cickovski, KFSCIS Assoc. Director	Discussions, consistency check vs. state requirements
July 2023	Susan Himburg and Gregory Murad Reis	Completion of the pre-proposal
July 2023 through September 2023	Susan Himburg and Gregory Murad Reis	Development of the full proposal
August 31st 2023	Gregory Murad Reis and CS UPC	Proposal approved

September 7th 2023	Gregory Murad Reis and CS UPC	5 new courses were approved
September 8th 2023	**KFSCIS Faculty**: Jason Liu, Gregory Murad Reis, Trevor Cickovski, Masoud Sadjadi, Nagarajan Prabakar, and **Math & Stats Department Faculty**: Louis Tebou, Ian Dryden, Julian Edward, Ciprian G Gal, Florence George, Sneh Gulati, B M Golam Kibria, and John Zweibel	Math & Stat Department Chair signed the MOU in support of the new degree
September 13th 2023	Susan Himburg representing FIU and other SUS representatives	Council of Academic Vice Presidents Academic Coordination Working Group met and there were no concerns regarding the BS in Data Science and Artificial Intelligence Pre-proposal
September 15th 2023	KFSCIS Faculty	Submission to KFSCIS Faculty for feedback
September 19th 2023	**KFSCIS Faculty**: Jason Liu, Gregory Murad Reis, Trevor Cickovski, Masoud Sadjadi, Nagarajan Prabakar, **KFSCIS PhD Candidate** Luana Okino Sawada, and **Assurant, Inc.:** Vice President, Advanced Analytics: Stacey Volmar and Global Data Analytics Vice President and Data Services: Carlos Chung	Meeting of KFSCIS Faculty Proposal Developers with two Industry Advisory Board members. Following an in-depth presentation of curriculum, Mr. Volmar and Mr. Chung provided their industry perspective of competencies and skills required of graduates in Data Science and Artificial Intelligence.
October 9th 2023	CEC Curriculum Committee	Submission to College of Engineering and Computing Curriculum Committee for approval
October 16th 2023	CEC Curriculum Committee	BS in Data Science and Artificial Intelligence Proposal for Review (Bulletin #2)
October 25th 2023	CEC Dean's Office	Submit to Faculty Senate Curriculum Committee (Bulletin # 2)
November 13th 2023	CEC Curriculum Committee	BS in Data Science and Artificial Intelligence Proposal Amendments Approved
December 8th 2023	Joint meeting of the Undergraduate Council and the University Curriculum Committee	Bulletin #2 Curriculum Hearing
January 23rd 2024	Gregory Murad Reis presents to Faculty Senate Members	Faculty Senate Approval
March 2024	BOT Members	BOT vote for approval
TBA	Academic Planning and Accountability	Submission to BOG staff for addition to degree inventory

E. In the table below, provide a timetable of key events necessary for implementing the proposed program following approval of the program by the Board office or the Board of Governors through to the addition of the program to the State University System Academic Degree Program Inventory.

Table: Events Leading to Implementation

Date	Implementation Activity
March-May 2024	Draft Catalogue Copy
March-May 2024	Develop department advising materials
Summer 2024	Meet with department advisors and Connect for Success Advisors

Institutional and State-Level Accountability
III. Need and Demand

A. Describe the workforce need for the proposed program. The response should, at a minimum, include the following:

- **current state workforce data as provided by Florida's Department of Economic Opportunity**
- **current national workforce data as provided by the U.S. Department of Labor's Bureau of Labor Statistics**
- **requests for the proposed program from agencies or industries in the university's service area**
- **any specific needs for research and service that the program would fulfill**

The proposed Bachelor of Science in Data Science and Artificial Intelligence seeks to address the increasing demand for skilled data professionals driven by the significant projected growth in this field (36% between 2021-2031 according to US Bureau of Labor Statistics). In 2021, the Data Science market size was estimated at USD 96.3 billion and it is expected to hit approximately USD 378.7 billion by 2030 (compound annual growth rate (CAGR) of 16.43% over the forecast period 2022 to 2030).

Locally in Miami, the technology sector, including data science, has seen a 40% increase in jobs over the past five years. The curriculum will emphasize on computer science, mathematics, statistics, and their application to real-world data problems, with a focus on data management, machine learning, predictive modeling, and effective communication of data insights

Locally and **statewide**, the program will invigorate Florida's tech economy by supplying trained data professionals capable of filling the critical skills gap in the rapidly growing field of data science. According to the [3]U.S. Bureau of Labor Statistics, the 2022 Median Pay for Data Scientists is $103,500 per year ($49.76 per hour); the employment of data scientists is projected to grow 35% from 2022 to 2032, much faster than the average for all occupations; and about 17,700 openings for data scientists are projected each year, on average, over the decade.

Nationally, our graduates will be well-prepared to contribute to the digital economy, where a strong foundation in data science is increasingly valued across diverse sectors, from healthcare to finance, and from manufacturing to e-commerce. Internationally, data science skills are recognized as a key driver of economic development and competitiveness. By providing a world-class education in data science, our program will enhance the global standing of Florida International University and contribute to international innovation and development. According to [1]US News and World Report in 2023, a data scientist job ranked at #22 out of 100 best jobs.

According to [4]**Glassdoor**, a data scientist is paid $152,298 (total pay) per year, with an average salary of $117,668 per year. [3]Operations research analyst (or data analyst) jobs are projected to grow 23%, another high-growth job title. The program will also strengthen the capacity for research funding. With a solid foundation in data science, faculty and students will be better equipped to secure grants in various fields where large-scale data analysis is central, such as in bioinformatics and environmental science research. This encourages cross-college collaboration, an important point of emphasis at FIU.

References:

[1] https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs *(Last accessed on September 12th, 2023)*
[2] https://www.bls.gov/ooh/math/operations-research-analysts.htm *(Last accessed on September 12th, 2023)*
[3] https://www.bls.gov/ooh/math/data-scientists.htm *(Last accessed on September 12th, 2023)*
[4] https://www.glassdoor.com/Salaries/data-scientist-salary-SRCH_KO0,14.htm *(Last accessed on September 12th, 2023)*

National and Florida Workforce Demand

In the table below, provide occupational linkages or jobs graduates will be qualified to perform based on the training provided for the proposed program that does not currently appear in the most recent version of the Search by CIP or SOC Employment Projections Data Tool provided periodically by Board staff.

Table: Occupational Linkages for the Proposed Program*

SOC Code (XX-XXXX)	Occupation Title	Source / Reason for Inclusion
15-2051	Data Scientist	Matched SOC within CIP crosswalk
15-2031	Operations Research Analysts	Role commonly overlaps with data science tasks and analytical functions (also matched SOC within CIP crosswalk)
15-1211	Computer Systems Analysts	Role commonly overlaps with data science tasks and analytical functions (also matched SOC within CIP crosswalk)
15-1252	Software Developers	Role commonly overlaps with data science tasks and analytical functions (also matched SOC within CIP crosswalk)
15-1212	Information Security Analysts	Role commonly overlaps with data science tasks and analytical functions (also matched SOC within CIP crosswalk)

*Source: Search by CIP or SOC Employment Projections Data Tool v6.0-02-13-2023

Complete the table below and summarize its contents in narrative form. Include data for all linked occupations, including those in the table above. Use data from the Search by CIP or SOC Employment Projections Data Tool provided periodically by Board staff.

Table: Labor Market Demand, CIP Code 30.7001

Occupations	Percent Change in Job Openings		Annual Average Job Openings		Total # of New Jobs		Education Level Needed for Entry
	FL 2020-2030	U.S. 2020-2030	FL 2020-2030	U.S. 2020-2030	FL 2020-2030	U.S. 2020-2030	
15-2051	53%	36%	360	13,500	1,350	40,600	Bachelors
15-2031	36%	23%	650	10,300	2,080	24,100	Bachelors
15-1211	22%	9%	3,030	44,500	6,860	50,900	Bachelors
15-1252	32%	26%	9,130	143,400	25,180	370,600	Bachelors
15-1212	52%	35%	1,080	19,500	3,990	56,500	Bachelors

Sources:
Date Retrieved: 08/31/2023
O*NET OnLine - https://www.onetonline.org/ CIP or SOC crosswalk missing data related to SOC codes, O*NET only complete data available.

For the CIP Code 30.7001, we have labor market demand data related to specific occupations from 2020 to 2030 for both Florida (FL) and the U.S. at large.

1. Data Scientists (SOC 15-2051):

- Florida is projected to see a 53% increase in job openings, leading to an average of 360 job openings annually. This results in a total of 1,350 new jobs in the decade.

- Nationally, the percentage change stands at 36%, with an annual average of 13,500 job openings and a total of 40,600 new jobs.

- The education level required for entry into this profession is a Bachelor's degree.

2. Operations Research Analysts (SOC 15-2031):

- In Florida, a 36% increase in job openings is projected, which translates to 650 annual job openings and 2,080 new jobs across the decade.

- Across the U.S., the increase is 23%, with 10,300 annual job openings and a total of 24,100 new jobs.

- A Bachelor's degree is the entry-level educational requirement.

3. Computer Systems Analysts (SOC 15-1211):

- Florida expects a 22% rise in job openings, leading to 3,030 job openings every year and 6,860 new jobs by 2030.

- For the U.S., a 9% rise is anticipated, resulting in 44,500 annual job openings and a total of 50,900 new jobs.

- Entry into this field typically requires a Bachelor's degree.

4. Software Developers, Applications (SOC 15-1252):

- In Florida, a 52% increase in job openings is projected, amounting to 1,080 job openings annually and 3,990 new jobs over the decade.

- On the national front, there is an expected 35% rise, translating to 19,500 job openings each year and 56,500 new jobs by 2030.

- A Bachelor's degree is the standard education level for entry.

5. Information Security Analysts (SOC 15-1212):

- In Florida, a 32% increase in job openings is projected, amounting to 9,130 job openings annually and a substantial 25,180 new jobs over the decade.

- On the national front, there is an expected 26% rise, translating to 143,400 job openings each year and a significant 370,600 new jobs by 2030.

- A Bachelor's degree is the standard education level for entry.

B. Provide and describe data that support student demand for the proposed program. Include questions asked, results, and other communications with prospective students.

In Fall 2023, program faculty administered a survey to students through the Knight Foundation School of Computing and Information Sciences asking the following two questions:

Question 1 - Current Academic Year of Students Enrolled at FIU

1. Freshman: 25.73% (79 students)
    - Just over a quarter of the respondents are in their first year at FIU.
2. Sophomore: 23.45% (72 students)
    - Nearly a quarter of the respondents are in their second year of study.
3. Junior: 43.00% (132 students)
    - This is the largest group of respondents, indicating that a substantial portion of the students surveyed are in their third year of study.

4. Senior: 6.51% (20 students)
    - A small fraction of the respondents is in their final year of undergraduate study.
5. Other: 1.30% (4 students)
    - A very small group of respondents fall outside the traditional academic year categories, possibly including non-traditional students or those in different types of programs.

Question 2 - Likelihood of Pursuing a BS in Data Science and Artificial Intelligence if Offered

- Extremely unlikely: 6.82% (21 students)
    - A small portion of the respondents feel strongly that they would not have pursued this degree.
- Somewhat unlikely: 11.69% (36 students)
    - A slightly larger group than the "extremely unlikely" category, but still a minority, would be somewhat hesitant to pursue the degree.
- Neither likely nor unlikely: 13.31% (41 students)
    - A group of students are neutral or unsure about whether they would have pursued the degree.
- Somewhat likely: 43.18% (133 students)
    - This is the largest group among the respondents for this question, indicating that a significant portion of the students would have considered pursuing the Data Science and Artificial Intelligence degree if it was available.
- Extremely likely: 25.00% (77 students)
    - A quarter of the respondents feel strongly that they would have pursued the Data Science and Artificial Intelligence degree, showing a substantial interest in this field among the surveyed students.

The majority of the respondents are in their junior year at FIU. Regarding the potential offering of a BS in Data Science and Artificial Intelligence, a notable majority (68.18% or 210 students) indicated that they would be "*somewhat*" or "*extremely*" likely to pursue the degree if it had been available when they declared their major. This suggests a strong interest in a Data Science and Artificial Intelligence program among the surveyed students at FIU.

Moreover, the Board of Governors' enrollment dashboard indicates, once a Data Science and Artificial Intelligence degree is opened, other SUS institutions realized continued gains in enrollment. As SOC 15-2051 Data Scientists is classified as a "bright outlook", this occupation is expected to grow rapidly in the next several years, which will continue to attract more and more students.

C. Complete Appendix A – Table 1 (1-A for undergraduate and 1-B for graduate) with projected student headcount (HC) and full-time equivalents (FTE).

- **Undergraduate FTE must be calculated based on 30 credit hours per year**
- **Graduate FTE must be calculated based on 24 credit hours per year**

In the space below, explain the enrollment projections. If students within the institution are expected to change academic programs to enroll in the proposed program, describe the anticipated enrollment shifts and impact on enrollment in other programs.

The table outlines the anticipated enrollments and the full-time equivalent (FTE) students for the proposed program across a period of five years. FIU calculates undergraduate FTEs as follows: FTIC students, due to persistent advising methodologies, are calculated at 30 credits per year; all other students, given their tendency to part-time enrollment, are calculated on 24 credits per year.

To explain the projections and understand the expected shifts in enrollment, let's consider the individual groups and then assess the total:

Year 1:

- **Upper-level internal transfers**: 3 students (2.4 FTE)
- **Progressing FTIC students**: 3 students (3 FTE)
- **Florida College System transfers**: 20 students (16 FTE)
- **Other Florida colleges/universities transfers**: 3 students (2.4 FTE)
- **Out of state transfers**: 1 student (0.8 FTE)
- **Other**: 0 students (0 FTE)

Total: 30 students (24.6 FTE)

Year-on-Year Growth:

Observing the year-on-year growth, we notice:

1. A steady increase in the number of students transferring from other majors within the university, reaching a peak in Year 3 before slightly declining.
2. A significant increase in FTIC students progressing from lower to upper levels, with an exponential growth, particularly noticeable in Year 5.
3. A consistent rise in the number of students transferring from the Florida College System and from other colleges both within Florida and out-of-state, illustrating a strong attraction of the proposed program to students from various educational backgrounds.

Projected Impacts on Other Programs:

- **Within the university**: The small growth of internal transfers (peaking in Year 3) suggests an interest in the proposed program from students in other majors within the university. These numbers decline by Year 5.
- **Florida College System and other transfers**: The steady increase of students coming from the Florida College System and other colleges (both in and out of Florida) represents an influx of students into the university, potentially boosting the institution's overall enrollment numbers without necessarily impacting other programs within the university.

Year 5 Projections:

By Year 5, the total headcount is expected to reach 150 students with 130 FTE, showing substantial growth from Year 1. The most noticeable increase is in the FTIC students progressing from lower to upper levels, indicating that the proposed program might become a choice for incoming students who remain in the program as they progress through their academic career.

The proposed program is expected to experience growth over a period of five years, particularly drawing from FTIC students progressing to upper levels and transfers from the Florida College System. While there is an anticipation of internal transfers, these numbers are not significant and will continue to decrease by Year 5.

D. Describe the anticipated benefits of the proposed program to the university, local community, and the state. The benefits of the program should be described both quantitatively and qualitatively.

To the University:

1. **Quantitative**:
    - **Enrollment Boost**: The increasing demand for professionals in data science and artificial intelligence is likely to draw a significant number of students, leading to an uptick in enrollment figures.
    - **Research Funding**: The interdisciplinary nature of data science and artificial intelligence can lead to a spike in research grant opportunities, from both public and private sectors.
2. **Qualitative**:
    - **Reputation Enhancement**: By offering a program in one of the most sought-after fields, FIU can solidify its reputation as an innovative and forward-looking institution.
    - **Interdisciplinary Collaborations**: Data science naturally bridges multiple disciplines, fostering greater collaboration between various departments within the university.

To the Local Community:

1. **Quantitative**:
    - **Job Creation**: The introduction of this program can lead to direct job opportunities within the university – for faculty, administrative roles, and support staff.
    - **Local Business Growth**: As students engage in internships and projects, local businesses can benefit from fresh insights and expertise, potentially driving business growth.
2. **Qualitative**:
    - **Local Innovation**: The skills imparted in the program can lead to local start-ups, tech solutions, and community-centered innovations.
    - **Community Development**: Data-driven projects can address local issues, from urban planning to public health, leading to tangible community improvements.

To the State:

1. **Quantitative**:

- **Economic Impact**: Graduates from the program will likely contribute significantly to the state's economy, whether through high-paying jobs, innovation, or entrepreneurship.

2. **Qualitative**:
   - **Talent Retention**: By offering a competitive program in Data Science and Artificial Intelligence, Florida can retain talent that might otherwise seek education and opportunities out-of-state.
   - **Statewide Decision Making**: With more data scientists available, state agencies can harness data more effectively, leading to better decision-making and policy formulation.
   - **Knowledge Economy Boost**: The program can contribute to Florida's vision of fostering a knowledge-based economy, emphasizing innovation and high-tech skills.

E. If other public or private institutions in Florida have similar programs at the four- or six-digit CIP Code or in other CIP Codes where 60 percent of the coursework is comparable, identify the institution(s) and geographic location(s). Summarize the outcome(s) of communication with appropriate personnel (e.g., department chairs, program coordinators, deans) at those institutions regarding the potential impact on their enrollment and opportunities for possible collaboration in the areas of instruction and research.

Utilizing IPEDs data, the only other degree programs at the Bachelorette level 30.7001 are located at University of Central Florida and Florida Polytechnic University. Those programs were specifically singled out at the pre-proposal stage, and no concerns regarding FIU's new degree were raised.

Given this degree is on the draft Programs of Strategic Emphasis, and the high Florida demand for graduates, it is important that more degrees in this CIP code are created to fill this demand.

F. If the proposed program substantially duplicates a program at Florida Agricultural and Mechanical University (FAMU), a letter of support from FAMU must be provided. The letter must address whether the proposed program may adversely affect FAMU's ability to achieve or maintain student diversity in its existing program. The institution's Equal Opportunity Officer shall review this section of the proposal, sign, and date the additional signature page to indicate that all requirements of this section have been completed.

FAMU does not offer a degree in CIP 30.7001.

This program is to be offered at FIU, which is a majority Hispanic institution and the nation's leading producer of Hispanic computing graduates, and top-three producer of Black computing graduates. Therefore, the KFSCIS will approach this new degree regarding the recruitment and retention of a diverse student population for the proposed BS in Data Science and Artificial Intelligence using proven strategies that have been effective for its BS in Computer Science and BS in Cybersecurity.

Of the 2,130 upper division students enrolled in the BS in Computer Science, 66% are Hispanic, 11% Black or African American, 5% Asian, 11% White, and 7% Other. Of the 171 upper division students enrolled in BS in Cybersecurity, 66% are Hispanic, 16% Black or African American, 3% Asian, 7% White, and 8% Other. The KFSCIS group expects similar enrollment diversity distribution in this new degree.

IV. Curriculum

A. Describe all admission standards and all graduation requirements for the program. Hyperlinks to institutional websites may be used to supplement the information provided in this subsection; however, these links may not serve as a standalone response. For graduation requirements, describe any additional requirements that do not appear in the program of study (e.g., milestones, academic engagement, publication requirements).

Admission requirements:

Freshman admission to FIU is selective and admission decisions are made based on the student's strong academic preparation. Competition for placement in the freshman class includes a review of all academic credentials and a completed file.

Freshmen students must be able to place in MAC 2281/2311 (Calculus I) or higher, in order to declare major in Data Science and Artificial Intelligence. Students who desire to pursue this major but are not able to place in MAC 2281/2311 (Calculus I) are conditionally admitted to the College but must meet the admission requirements for the major for which admission is being sought.

Generally, transfer admission to FIU is based on successful completion of the common prerequisites, with a grade of 'C' or better in each course, an associate of arts degree, and a minimum 2.0 GPA. Students transferring without an AA degree are evaluated based on completion of FIU's University Core Curriculum (General Education) with a minimum 2.0 GPA. Students must be able to complete the degree program in an appropriate amount of time to be accepted into the major.

Progression requirements:

If effective progress is not made by the student towards meeting the Calculus-ready admission requirements, the student may be redirected to another major that better fits to the student's skills, abilities, and interests. Students must successfully pass the common prerequisite courses within two attempts. A 'DR' grade counts as an attempt. In order to enroll into upper division Data Science and Artificial Intelligence course requirements, a student must earn a grade of 'C' or higher in all Calculus courses, Physics I with Calculus, Statistics, and Biology.

Students who are unsuccessful in passing common prerequisites after two attempts will be advised to change their major into an area where they can be successful.

Graduation requirements:
Students must meet all the universities' requirements for the graduation, including successful completion of 120 credits, the University Core Curriculum (an 'AA' meets this requirement), two Global Learning courses, the Civic Literacy requirement, and complete all degree requirements described below and have achieved a 2.0 GPA.

B. Describe the specific expected student learning outcomes associated with the proposed program and include strategies for assessing the proposed program's learning outcomes. If the proposed program is a baccalaureate degree, include a hyperlink to the published Academic Learning Compact and the document itself as Appendix C.

Table: Student Learning Outcomes and Direct Measures

Learning Outcomes	Description	Direct Measures	Example Courses
Content/Discipline Knowledge	Students will demonstrate mastery in core concepts of data science and artificial intelligence, including analytics, modeling, machine learning, and AI.	Exams, quizzes, lab assignments, and final projects.	CAP 2XXX (Introduction to Data Science), CAP 3XXX (Advanced Data Science), CAP 4612 (Introduction to Machine Learning), CAP 4630 (Artificial Intelligence)
Critical Thinking	Students will develop the ability to analyze data-driven problems, formulate solutions, and apply appropriate techniques to address complex challenges.	Problem-solving exercises, case studies, and projects.	COP 2XXX (Computational Thinking), CAP 4770 (Introduction to Data Mining), MAD 3401 (Numerical Analysis), CAP 4830 (Fundamentals of Modeling & Simulations)
Oral Communication	Students will be able to effectively communicate complex data science concepts, findings, and solutions verbally to both technical and non-technical audiences.	Presentations, group projects, class discussions, and capstone defenses.	CGS 3095 (Technology in the Global Arena), ENC 3249 (Prof Tech Writing Comp), CIS 3950 (Capstone I), CIS 4951 (Capstone II)

Written Communication	Students will demonstrate the ability to write clear, concise, and logically structured reports, research papers, and documentation.	Written assignments, research papers, lab reports, and capstone documentation.	ENC 3249 (Prof Tech Writing Comp), CAP 2XXX (Introduction to Data Science), CAP 3XXX (Advanced Data Science), CIS 3950 (Capstone I), CIS 4951 (Capstone II)

C. If the proposed program is an AS-to-BS capstone, provide evidence that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as outlined in State Board of Education Rule 6A-10.024. Additionally, list any prerequisites and identify the specific AS degrees that may transfer into the proposed program.

☒ **Not applicable to this program because it is not an AS-to-BS Capstone.**

D. Describe the curricular framework for the proposed program, including the following information where applicable:

- **total number of semester credit hours for the degree**

This is a 120-credit undergraduate program where at least 50% of the upper division credits required for the BS in Data Science and Artificial Intelligence must be taken at FIU.

- **number of credit hours for each course**

The curriculum below includes credit hours per course.

- **required courses, restricted electives, and unrestricted electives**

Lower Division

Students must complete the following courses as part of their course work, preferably during the first 60 credits:

Table: Common Prerequisites for Bachelor of Science in Data Science and Artificial Intelligence

Common Prerequisites	FIU Course
MAC X311 - Calculus I (4 credits)	MAC 2311 - Calculus I (4 credits)
MAC X312 - Calculus II (4 credits)	MAC 2312 - Calculus II (4 credits)
MAC X313 - Calculus III (4 credits)	MAS 3105 - Linear Algebra (3 credits) or MAC 2313 - Calculus III (4 credits) or COT 3510 - Applied Linear Structures for Computing (3 credits)
COPx000-x999 Computer Programming (0 credits)	COP 2XXX - Python Programming I (3 credits)
BSC X010 - General Biology I and BSC X010L - General Biology I Lab (4 credits)	BSC 2010 - General Biology I and BSC 2010L - General Biology I Lab (4 credits)
PHY X048 - Physics with Calculus I and PHY X048L General Physics Lab I (5 credits)	PHY 2048 - Physics with Calculus I and PHY 2048L General Physics Lab I (5 credits)
STA X023 - Statistics I (3 credits)	STA 2023 Statistics for Business and Economics (3 credits) or STA 3111 - Statistics I (3 credits) or STA 3163 - Statistical Methods I (3 credits)

Core Courses (36 credits)

Table: Core Courses of the Bachelor of Science in Data Science and Artificial Intelligence

CTS 1500	Emerging Topics in Digital Life (GL*)	3
COP 3XXX	Computational Thinking	3
CAP 2XXX	Introduction to Data Science	3
COP 3XXX	Python Programming II	3
CGS 3095	Technology in the Global Arena (GL*)	3
COT 3100 or MAD 2104	Discrete Structure or Discrete Mathematics	3 3
ENC 3249	Prof Tech Writing Comp	3
COP 3465	Data Structures for IT	3
CAP 3XXX	Advanced Data Science	3
CIS 3950	Capstone I	1
CAP 4630	Artificial Intelligence	3
CIS 4951	Capstone II	2
CAP 4612	Introduction to Machine Learning	3

** Included in the FIU Global Learning list of courses*

Concentration Courses (12 credits)

Students choose one of the following concentrations and complete 12 credits:

1. **Computational and Big Data Analytics** (strong emphasis on developing programming and analytical skills, as well as gaining a solid understanding of computer science principles, and encourages students to apply the latest technologies in data storage, manipulation, security, retrieval, mining, machine learning, AI, and cloud computing). Courses to be offered for this concentration:

CAP XXXX	Introduction to Deep Learning	3
CAP 4770	Introduction to Data Mining	3
COP 4534	Algorithm Techniques	3
COT 4431	Applied Parallel Computing	3
CEN 4083	Introduction to Cloud Computing	3
COP 4703	Information Storage and Retrieval Concepts	3

2. **Artificial Intelligence and Robotics** (developing algorithms and computational techniques to enable machines to learn, reason, and adapt, empowering them to solve complex problems and enhance decision-making processes). Courses to be offered for this concentration:

CAP 4770	Introduction to Data Mining	3
CAP 4641	Natural Language Processing	3
CAP 4453	Introduction to Robot Vision	3
CDA 4625	Introduction to Mobile Robotics	3
CAP XXXX	Introduction to Deep Learning	3
CAP 4506	Introduction to Game Theory	3

3. **Statistical Modeling** (statistically driven decision making with emphasis on mathematical theory that underlies the models and programming). Courses to be offered for this concentration:

CAP 4830	Fundamentals of Modeling & Simulations	3
STA 3164	Statistical Methods II	3
STA 4234	Introduction to Regression Analysis	3
MAD 3301	Graph Theory	3
MAD 3401	Numerical Analysis	3
MAD 4203	Introduction to Data Mining	3

*Prerequisite: STA 3163 - Statistical Methods I (3 credits)

Elective Courses (12 credits)

Students will choose electives with the approval of their academic advisors. Elective courses can be taken within or outside of KFSCIS.

- **a sequenced course of study for all majors, concentrations, tracks, or areas of emphasis**

Third and Fourth Years

Third Year - Semester 1
- CTS 1500 - Emerging Topics in Digital Life - 3 credits
- COP 2XXX - Computational Thinking - 3 credits
- COP 3XXX - Python Programming II - 3 credits
- ENC 3249 - Prof Tech Writing Comp - 3 credits
- CGS 3095 - Technology in the Global Arena - 3 credits

Total number of credits: 15

Third Year - Semester 2
- CAP 2XXX - Introduction to Data Science - 3 credits
- COP 3465 - Data Structures for IT - 3 credits
- COT 3100 - Discrete Structures - 3 credits
- Elective Course I - 3 credits
- Elective Course II - 3 credits

Total number of credits: 15

Fourth Year - Semester 1
- CAP 3XXX - Advanced Data Science - 3 credits
- CIS 3950 - Capstone I - 1 credit
- CAP 4630 - Artificial Intelligence - 3 credits
- Concentration Course I - 3 credits
- Concentration Course II - 3 credits
- Elective Course III - 3 credits

Total number of credits: 16

Fourth Year - Semester 2
- CIS 4951 - Capstone II - 2 credits
- CAP 4612 - Introduction to Machine Learning - 3 credits
- Concentration Course III - 3 credits
- Concentration Course IV - 3 credits
- Elective Course IV - 3 credits

Total number of credits: 14

E. Provide a brief description for each course in the proposed curriculum.

BSC 2010 General Biology I (3). BSC 2010L General Biology I Lab (1). Biomolecules, cells, energy flow, genetics, and physiology. Science background or Biology major recommended. Concurrent registration in both lecture and laboratory is required. Prerequisite or Corequisite (Lab): BSC 2010.

CAP 2XXX Introduction to Data Science (3). Fundamental data science lifecycle topics with key concepts in data ethics, governance, applied statistics, and computing with hands-on experience to apply knowledge in real-world scenarios. Prerequisite: COP 2XXX – Python Programming I or Advisor's Permission. Corequisite: COP 3XXX – Computational Thinking.

CAP 3XXX Advanced Data Science (3). Advanced exploration topics such as machine learning, neural networks, reinforcement learning, time series, NLP, big data management, ethical AI, and emerging tech trends in data analysis. Prerequisite: CAP 3XXX - Introduction to Data Science. Corequisite: COP 3465 - Data Structures for IT.

CAP 4453 Introduction to Robot Vision (3). Perspective and orthographic projections; the processing of edges, regions, motion, shading, texture, object detection, recognition, and machine learning. Prerequisites: COP 3530 and MAC 2312.

CAP 4506 Introduction to Game Theory (3). Introduction to all major topics of game theory, including game representations, solution concepts, algorithms & complexity, repeated games, learning, auctions, voting, applications to many disciplines. Prerequisites: MAC 2312 or Permission of the Instructor.

CAP 4612 Introduction to Machine Learning (3). Topics will include concepts, principles, and approaches of machine learning, including classification, clustering, structured models and recommendation system. Prerequisites: COP 3530 and STA 3033.

CAP 4630 Artificial Intelligence (3). Introduction to all major topics in artificial intelligence, including search, logic, optimization, constraint satisfaction, planning, probabilistic reasoning, multiagent systems, machine learning. Prerequisite: COP 3530.

CAP 4641 Natural Language Processing (3). The concepts and principles of computer processing of natural language, including linguistic phenomena, formal methods, and applications. Prerequisite: COP 3530.

COP 4703 Information Storage and Retrieval Concepts (3). Introduction to information management and retrieval concepts. The design and implementation of a relational database using a commercial DBMS. Online information retrieval and manipulation. Not acceptable for credit for Computer Science majors. Prerequisites: COP 3804 or COP 3337. This course will have additional fees.

CAP 4770 Introduction to Data Mining (3). Data mining applications, data preparation, data reduction and various data mining techniques such as association, clustering, classification, anomaly detection. Prerequisite: COP 3530. Corequisite: COP 4710.

CAP 4830 Fundamentals of Modeling & Simulations (3). Introduction to discrete-event systems, a survey of modeling tools, mathematical & statistical modeling, role of random numbers, verification & validation, and applications. Prerequisite: (STA-2023 or STA-3033) and COP-3530.

CAP XXXX Introduction to Deep Learning (3). This course introduces students to the fundamentals of deep learning, covering feed forward neural networks, convolutional neural networks (CNNs), recurrent neural networks (RNNs), and advanced models like transformers. Prerequisite: STA 3033, COP 3465 (or COP 3530).

CDA 4625 Introduction to Mobile Robotics (3). A first course on the theoretical and practical aspects of mobile robotics. Topics include locomotion, kinematics, sensing and perception, localization and mapping, planning and navigation. Prerequisites: COP 3530 and STA 3033.

CEN 4083 Introduction to Cloud Computing (3). Topics include the concepts and principles of cloud computing and the techniques of using cloud systems and developing cloud applications. Prerequisites: CNT4713 and (CDA 3102 or CDA4101) or permission of the instructor.

CGS 3095 Technology in the Global Arena – GL (3). Legal, ethical, social impacts of computer technology on society, governance, quality of life: intellectual property, privacy, security, professionalism, social identity in the U.S. and globally. Prerequisites: (COP 2250 or COP 2210) and (ENC 3213 or ENC 3249).

CIS 3950 Capstone I (1). Students learn how to perform efficiently in Agile/Scrum teams of up to 5 members

and learn how to design and implement solutions to problems as a team. Prerequisite: (COP 3337 or COP 3804) and Junior Standing.

CIS 4951 Capstone II (2). Students work on faculty supervised projects in teams of up to 5 members to design and implement solutions to problems utilizing knowledge obtained across the spectrum of Computer Science courses. Prerequisite: CIS 3950 and Senior Standing.

COP 2XXX Python Programming I (3). Introduction to computer programming using Python including fundamental concepts and systematic design techniques. Students will write programs that computationally solve and reduce problems. Prerequisite: MAC 1140 or MAC 1147 or MAC 2233 or MAC 2311 or Advisor's permission.

COP 3XXX Computational Thinking (3). Computational thinking principles, covering algorithms, data structures, problem-solving, problem decomposition, creativity, and topics in recursion and ethical considerations in computing. Prerequisite: COP 2XXX - Python Programming I or COP 2210 - Programming I or COP 2250 - Programming in Java or Advisor's Permission.

COP 3XXX Python Programming II (3). Object-oriented principles, handling modules, packages, and decorators, working with databases, data structures, and visualization tools. More complex Pythonic solutions for real-world challenges. Prerequisite: COP 2XXX - Python Programming I. Corequisite: COP 3XXX - Computational Thinking.

COP 3465 Data Structures for IT (3). Basic concepts of running time of a program, data structures including lists, stacks, queues, binary search trees, and hash tables, and internal sorting. Not acceptable for credit for CS majors. Prerequisite: Programming II (IT). This course will have additional fees.

COT 3100 Discrete Structures (3). Align mathematical and computational concepts by applying computing to propositional logic, sets, functions relations, induction, recursion, combinatorics, Boolean algebra, graph and trees. Prerequisites: MAC XXXX and COP XXXX Corequisites: (COP 2210 or COP 2250 or EEL 2880).

COT 3510 Applied Linear Structures for Computing (3). This course is designed to prepare computer science/IT students with the applied knowledge of linear structures necessary for computing, data analytics, and machine learning. Prerequisite: MAC-XXXX and COPXXXX Corequisite: COT 3100 or MAD 2104

COT 4431 Applied Parallel Computing (3). This course teaches advance undergraduate and graduate students to solve problems from scientific, social and financial domains using parallel computing principles and techniques. Prerequisites: (COP 3530 and (CDA 3102 or CDA 4101 or EEL 4709)) or permission of the instructor.

COP 4534 Algorithm Techniques (3). Basic algorithm design, including greedy algorithms, divide-and-conquer, dynamic programming, randomization, and backtracking. Graph, string, numerical, geometric, and optimization algorithms. Prerequisite: COP 3530.

CTS 1500 Emerging Topics in Digital Life (3). Explore ever-changing boundaries between public and private digital lives, and the cultural and societal impacts of data collection, misinformation, media bias, cyber threats, and emerging technologies.

ENC 3249 Professional and Technical Writing for Computing (3). Introduces students to the expectations of written and verbal communication in the computer science profession; explores the ways in which technology and media help shape professional communication.

MAC 2311 Calculus I (4). Limits, derivatives and their formulas, applications of derivatives, introduction to anti derivatives, introduction to parametric curves. Prerequisites: Grade of "C" or higher in MAC 1147 or MAC 1140 and MAC 1114 or appropriate score on placement exam for students with no prior college-level coursework in mathematics. (F,S,SS).

MAC 2312 Calculus II (4). Applications of the integral, integration techniques, improper integrals, Riemann sums, the integral, Fundamental Theorem of Calculus, infinite series, T aylor series, polar coordinates, parametric equations. Prerequisites: Grade of "C" or higher in MAC 2311 or AP Calculus credit. (F,S,SS).

MAC 2313 Calculus III (4). This course deals with the differential and integral calculus of real valued multivariable functions. The topics include: directional and partial derivatives, gradients, and their applications; differential calculus of vector valued functions; multiple, iterated, line, and surface integrals. Prerequisites: MAC 2312 or equivalent with a grade of 'C' or better. (F,S,SS).

MAD 2104 Discrete Mathematics (3). Sets, functions, relations, permutations, and combinations, propositional logic, matrix algebra, graphs and trees, Boolean algebra, switching circuits. Prerequisites: MAC 1105 or MGF 1106 or appropriate score on placement exam for students with no prior college-level coursework in mathematics. (F,S,SS).

MAD 3301 Graph Theory (3). An introduction to the study of graphs. Topics include the following: paths and circuits, connectedness, trees, shortest paths, networks, planar graphs, the coloring of graphs, and directed graphs. Applications of graphs to computer science will be discussed. Prerequisites: COP 2210, COP 2250, or COP 2270 or CGS 2420 and either MAS 3105 or MAD 2104. (F,S,SS).

MAD 3401 Numerical Analysis (3). Basic ideas and techniques of numerical analysis. Topics include: finite differences, interpolation, solution of equations, numerical integration and differentiation, applications, introduction to applied linear algebra. This course will make extensive laboratory use of the computer facility. Prerequisites: COP 2210, COP 2250, COP 2270, or CGS 2420 and MAC 2312. (F,S,SS).

MAD 4203 Introduction to Combinatorics (3). A survey of the basic techniques of combinatorial mathematics. Topics will include the Pigeonhole Principle, Binomial Coefficients, Inclusion-Exclusion, Recurrence Relations, and Generating Functions. Prerequisites: MAC 2312 and MAD 2104.

MAS 3105 Linear Algebra (3). An introduction to the topics in linear algebra most often used in applications. Topics include: matrices and their applications; simultaneous linear equations and elementary operations; linear dependence; vector spaces; rank and inverses; inner products and 'best' approximations; numerical solutions of simultaneous linear equations; eigen-values and eigenvectors; iterative methods for calculating eigenvalues; and systems of linear equations. Prerequisite: MAC 2312. (F,S,SS).

PHY 2048 Physics with Calculus I (4). First in physics with calculus sequence. Covers kinematics, Newton's Laws, conservations laws, gravitation, fluids, sound, and thermodynamics. PHZ 2102 strongly recommended for problem solving skills. Calculus I (MAC 2311 or equivalent) should be taken prior to or concurrent with this course. Prerequisite or Corequisite: MAC 2311 or equivalent.

PHY 2048L General Physics Laboratory I (1). Laboratory sections of PHY 2048, PHY 2049, PHY 2053, PHY 2054. Prerequisites or Corequisites: PHY 2048, PHY 2049, PHY 2053, PHY 2054. (Lab fees assessed) (F,S,SS).

STA 2023 Statistics for Business and Economics (3). Starting with an introduction to probability, the course provides an introduction to statistical techniques used in management science. It includes descriptive statistics, probability distributions, estimation and testing of hypotheses. Subsequent credit for STA 2122 or STA 3111 will not be granted. Prerequisite: High school algebra. (F,S,SS).

STA 3111 Statistics I (3). Descriptive statistics. Basic probability rules. Discrete and continuous probability distributions. Point and interval estimation, hypothesis testing based on a single sample. Comparison of two proportions using independent and large samples. Subsequent credit for STA 2122 or STA 2023 will not be granted. Prerequisite: High school algebra. (F,S,SS).

STA 3163 Statistical Methods I (3). This course presents tools for the analysis of data. Specific topics include:

use of normal distribution, tests of means, variances and proportions; the analysis of variance and covariance (including contrasts and components of variance models), regression, correlation, sequential analysis, and non-parametric analysis. Prerequisites: A course in statistics or STA 2122 or MAC 2312 or equivalent. (F,S).

STA 3164 Statistical Methods II (3). This course presents tools for the analysis of data. Specific topics include: use of normal distribution, tests of means, variances and proportions; the analysis of variance and covariance (including contrasts and components of variance models), regression, correlation, sequential analysis, and non-parametric analysis. Prerequisite: STA 3163. (F,S).

STA 4234 Introduction to Regression Analysis (3). Multiple and polynomial regression, residual analysis, model identification and other related topics. Credit will not be given for both STA 4234 and STA 5236. Prerequisites: STA 3112 or STA 3123 or STA 3164.

F. For degree programs in medicine, nursing, and/or allied health sciences, identify the courses with the competencies necessary to meet the requirements in Section 1004.08, Florida Statutes. For teacher preparation programs, identify the courses with the competencies required in Section 1004.04, Florida Statutes.

☒ Not applicable to this program because the program is not a medicine, nursing, allied health sciences, or teacher preparation program.

G. Describe any potential impact on related academic programs or departments, such as an increased need for general education or common prerequisite courses or an increased need for required or elective courses outside of the proposed academic program. If the proposed program is a collaborative effort between multiple academic departments, colleges, or schools within the institution, provide letters of support or MOUs from each department, college, or school in Appendix D.

In Fall 2023, the KFSCIS met with the Department of Mathematics & Statistics to discuss the proposed BS in Data Science and Artificial Intelligence. Previously, in September of 2022, an MOU regarding a new major "Major in Mathematics - Mathematical Data Science" in the existing BS in Mathematics was executed. In the most recent meeting, the attached MOU (Appendix D) was discussed and agreed upon.

H. Identify any established or planned educational sites where the program will be offered or administered. Provide a rationale if the proposed program will only be offered or administered at a site(s) other than the main campus.

This degree will only be offered at FIU's main campus, Modesto A. Maidique campus.

I. Describe the anticipated mode of delivery for the proposed program (e.g., face-to-face, distance learning, hybrid). If the method(s) of delivery will require specialized services or additional financial support, describe the projected costs below and discuss how they are reflected in Appendix A – Table 3A or 3B.

The degree will initially be launched primarily face-to-face, with some courses also available through distance learning. As the demand increases, the possibility remains to offer the degree 100% online.

J. Provide a narrative addressing the feasibility of delivering the proposed program through collaboration with other institutions, both public and private. Cite any specific queries of other institutions concerning shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

At the undergraduate level, FIU will have sufficient demand and resources to offer this degree solely by itself.

K. Describe any currently available sites for internship and/or practicum experiences. Describe any plans to seek additional sites in Years 1 through 5.

☒ Not applicable to this program because the program does not require internships or practicums.

V. Program Quality Indicators - Reviews and Accreditation

A. List all accreditation agencies and learned societies concerned with the proposed program. If the institution intends to seek specialized accreditation for the proposed program, as described in Board of Governors Regulation 3.006, provide a timeline for seeking specialized accreditation. If specialized accreditation will not be sought, please explain.

At the current stage, we are considering specialized accreditation from the Accreditation Board for Engineering and Technology, Inc. (ABET). ABET accredits programs in the disciplines of applied and natural science, computing, engineering, and engineering technology at the associate, bachelor, and master levels. We intend to align our program curriculum with the standards set forth by ABET and an estimated timeline for seeking specialized accreditation includes:

1. **Year 1-2** (following program inception) - Develop and fine-tune the curriculum adhering to ABET standards.
2. **Year 3** - Self-evaluation and preparation of documents showcasing adherence to ABET standards.
3. **Year 4** - Submit a Request for Evaluation (RFE) to ABET.
4. **Year 5** - Undergo the ABET accreditation evaluation process.

This will be done to ensure the highest standards of education and to facilitate greater opportunities for our students in the global market.

Furthermore, ABET programs are usually associated with CS and Engineering and so our curriculum is guided by that and differs from those at other institutions that are housed in other colleges and not planning to seek ABET accreditation.

B. Identify all internal or external academic program reviews and/or accreditation visits for any degree programs related to the proposed program at the institution, including but not limited to programs within the academic unit(s) associated with the proposed degree program. List all recommendations from the reviews and summarize the institution's progress in implementing those recommendations.

The Knight Foundation School of Computing and Information Sciences has recently had all three of our bachelor-of-science programs that went under CAC review last year have officially received their ABET accreditations. This includes B.S. in Computer Science (BS-CS), B.S. in Information Technology (BS-IT), and B.S. in Cybersecurity (BS-CY). The BS-CS ABET accreditation has been renewed, while both BS-IT and BS-CY are newly accredited programs.

C. For appropriate degree programs, discuss how employer-driven or industry-driven competencies were identified and incorporated into the curriculum. Additionally, indicate whether an industry or employer advisory council exists to provide input for curriculum development, student assessment, and academic-workforce alignment. If an advisory council is not already in place, describe any plans to develop one or other plans to ensure academic-workforce alignment.

As this degree was designed to meet the standards of the Accreditation Board for Engineering and Technology, Inc. (ABET), it was important to utilize their defined content requirements in the new degree. Furthermore, several universities known for their strong reputation in the field of Computer and Data Science were reviewed for an outline of this degree's core curriculum.

According to ABET, these requirements are at least 45 semester credit hours (or equivalent) of data science course work that must cover:

1. Fundamental data science lifecycle topics:

a) Data acquisition and representativeness

b) Data management
c) Data preparation and integration
d) Data analysis
e) Model development and deployment
f) Visualization and communication of the knowledge obtained from the data

2. Concepts that span and are applied to the data science lifecycle:

a) Data ethics including legitimate use and algorithmic fairness
b) Governance including privacy, security, and stewardship
c) Applied Statistical and mathematical topics including inference, modeling, linear algebra, probability, and optimization
d) Computing including data structures and algorithms

3) These requirements are at least 45 semester credit hours (or equivalent) of data science course work that must cover:

a) Advanced data science coursework that provides depth
b) Coverage of at least one application area to provide a context for data science activities
c) A major project that incorporates an application area and requires integration and application of knowledge and skills acquired in earlier course work

Furthermore, the innovative work of IBM in establishing Data Science Foundational Competencies and Performance Criteria provided a detailed curriculum framework endorsed by the US Depart of Labor for their Data Science Apprentice Program. The courses developed by FIU for this degree program reflect many of these areas of the Data Science Skills Competency Model. Link available at https://www.ibm.com/downloads/cas/7109RLQM (*Last accessed on September 12th, 2023*).

Knight Foundation School of Computing and Information Sciences has an active Industry Advisory Board. This group assists in student assessment and strengthens academic-workforce alignment of the KFSCIS's degree programs. Two board members met with the faculty responsible for the proposal development and provided valuable feedback (September 19th, 2023). They reinforced the need for some of the competencies in relational databases (1-b), cloud computing, ethical and privacy considerations in AI (2-a and 2-b), business organization (3-c), and large language models (1-e) for graduates in this degree. In the future, these individuals' participation will be sought in the review of capstone projects.

VI. Faculty Participation

A. Use Appendix A – Table 2 to identify existing and anticipated full-time faculty who will participate in the proposed program through Year 5, excluding visiting or adjunct faculty. Include the following information for each faculty member or position in Appendix A – Table 2:

- **the faculty code associated with the source of funding for the position**
- **faculty member's name**
- **the highest degree held**
- **academic discipline or specialization**
- **anticipated participation start date in the proposed program**
- **contract status (e.g., tenure, tenure-earning, or multi-year annual [MYA])**
- **contract length in months**
- **percent of annual effort that will support the proposed program (e.g., instruction, advising, supervising)**

This information should be summarized below in narrative form. Additionally, provide the curriculum vitae (CV) for each identified faculty member in Appendix E.

A list of qualified faculty, with doctoral degrees, who will be teaching in Year 1 and Year 5 is included in Appendix A - Table 2. Each 9-month faculty meets ABET and University requirements for teaching in the discipline (see Appendix E). There is a balance of tenured, tenured-earning, and multi-year annual faculty appointments.

In Year 1, seven faculty will be teaching the new junior students in the required curriculum. As the caps on courses in the School are 50, the teaching effort for the anticipated 30 new students is calculated on the Faculty Salaries tab. The total faculty effort when converted to person years is 0.35.

In Year 5, a total of 15 faculty will be teaching the full cadre of senior (60) and junior (90) students. The percent effort for one class during an academic year is 0.11. The total faculty effort when converted to person years is 1.35.

B. Provide specific evidence demonstrating that the academic unit(s) associated with the proposed program has 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, and other qualitative indicators of excellence (e.g., thesis, dissertation, or research supervision).

The KFSCIS has continued to be efficient and growing the number of students and a repertoire of research enterprise. During the span from 2019 to present, the KFSCIS demonstrated a vibrant and dynamic research environment, with a steady increase in the number of principal investigators and awards received, showcasing a fertile ground for research and innovation. The total amount of funding over these years amassed to a staggering $58,525,765.87 through a total of 245 awards, a clear indicator of the substantial financial backing that the institution has received to foster research and innovation.

The KFSCIS Student Headcount and Degree data reflect strong academic programs and the ability of the School to graduate record numbers of STEM graduates.

Table: Detailed information on the research grants awarded to the Knight Foundation School of Computing and Information Sciences over several fiscal years

Fiscal Year	Award Action Total Amount	Count of Awards	Count of Principal Investigators
2019	$8,510,614.57	38	15
2020	$7,995,210.97	38	18
2021	$19,104,727.95	49	19
2022	$10,208,874.98	65	22
2023	$10,998,971	47	19
2024*	$1,707,366.4	8	6

**Preliminary data for 2024-2025*

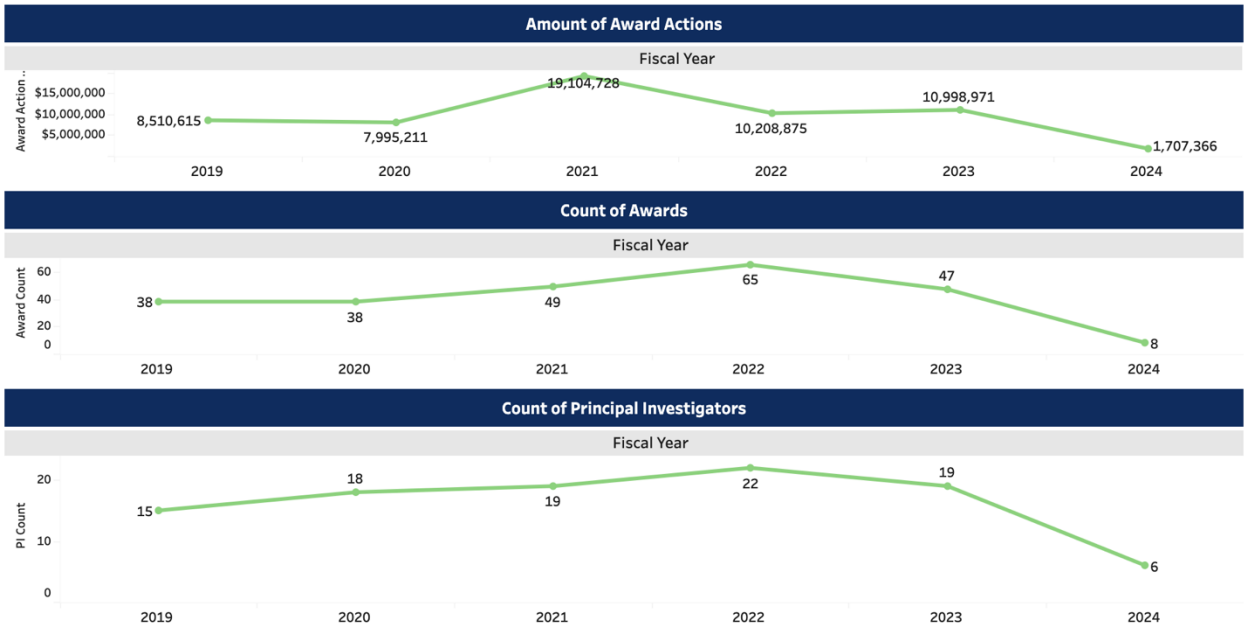

Image: Detailed information on the research grants awarded to the Knight Foundation School of Computing and Information Sciences over several fiscal years

Table: KFSCIS Headcount

	Fall 2018	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Lower Division	495	514	515	567	790	971
Upper Division	1651	1961	2165	2397	2637	2909
Total Undergraduate	**2146**	**2475**	**2680**	**2964**	**3427**	**3880**
Masters	230	219	208	217	342	370
Ph.D.	84	83	72	88	95	98
Total Graduate	**314**	**302**	**280**	**305**	**437**	**468**

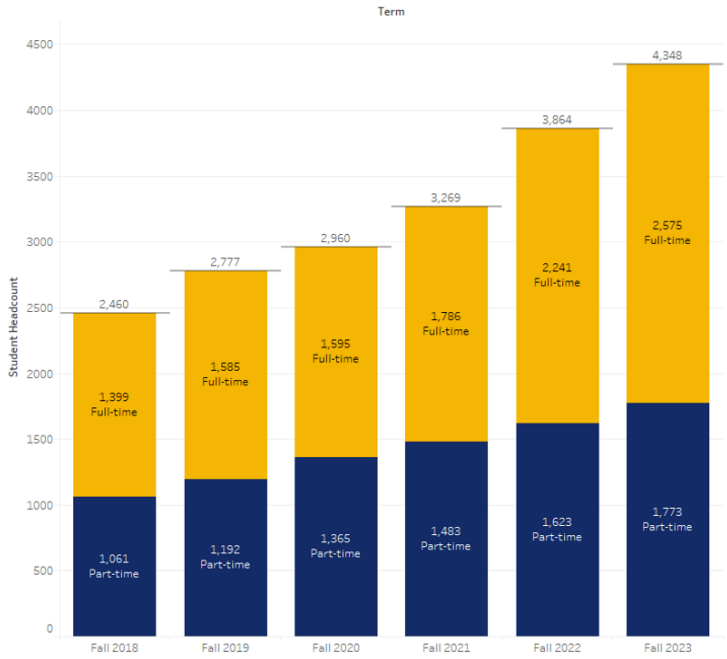

Image: KFSCIS Headcount

	17-18	18-19	19-20	20-21	21-22	22-23
Undergraduate FTE	1492	1703	1841	1915	2067	2263
Graduate FTE	169	172	186	168	192	281
Total FTE	2661	1875	2027	2083	2259	2544

Table KFSCIS FTE Generated

Degrees Awarded	17-18	18-19	19-20	20-21	21-22	22-23
Bachelors	384	397	523	661	668	723
Masters	81	89	119	100	79	131
Ph.D.	9	13	8	13	10	14

Table KFSCIS Degrees Awarded

VII. Estimate of Investment

A. Use Appendix A – Table 3A or 3B to provide projected costs and associated funding sources for Year 1 and Year 5 of program operation. In narrative form, describe all

projected costs and funding sources for the proposed program(s). Data for Year 1 and Year 5 should reflect snapshots in time rather than cumulative costs.

Appendix A – Table 3A presents the E&G Budget in Year 1 and Year 5 for the new program. All costs will be covered by Reallocated Base. The following categories are included:

Salary and Benefits (Faculty): Y1 $66,743 | Y5 $266,212
Faculty salaries were calculated according to the percentage effort of teaching in the program using their 9-month base salary. Given the initial enrollment of 30 students in Year 1 (juniors only) and 150 in Year 5, there is a significant increase in salaries to cover both junior and senior courses by Year 5.

Salaries and Benefits (A&P and USPS): Y1 $15,000 | Y5 $31,000
Portions of two service positions are included in the program budget. An academic advisor will devote 0.06 FTE in Year 1 and 0.12 FTE in Year 5 to support students' success.

Technical Support Staff member from the KFSCIS will devote 0.05 FTE in Year 1 and 0.1 FTE in Year 5 to guarantee proper hardware and software compliances.

The FTE portion of these two positions totals 0.11 in Year 1 and 0.22 in Year 5.

OPS (including assistantships & fellowships): Y1 $10,000 | Y5 $61,800
In Year 1, $10,000 will be used to support undergraduate graders. In Year 5, $15,000 will support undergraduate graders in addition to 1.5 graduate assistantships. Both graders and graduate assistants will support the instructors in the undergraduate courses, reflecting the program's commitment to supporting students' success.

Programmatic Expenses: Y1 $2,000 | Y5 $5,000
In Year 1, $1500 will be used for marketing and outreach, and $500 for software licenses. In Year 5, $1500 will be dedicated to marketing and information sessions; $1,000 for software licenses; $1000 for Cloud Servers; and $1500 for Faculty Professional Development (travel, special training in novel Cloud Computing and Data Science frameworks).

Total Cost: Y1 $93,743 | Y5 $364,012
Over a span of five years, there is a significant increase in the Total E&G (Education & General) Funding for the program. In the first year, the funding amounts to $93,743, which substantially grows to $364,012 by the fifth year.

While funding and enrollment increases, the efficiency in terms of cost incurred per student (E&G Cost per FTE) shows an improvement. In Year 1, the E&G Cost per FTE is approximately $3,811. By Year 5, despite the increase in students, the cost per FTE decreases to roughly $2,800. This indicates a more cost-effective allocation of resources as the program matures and expands.

B. Use Appendix A – Table 4 to show how existing Education & General (E&G) funds will be reallocated to support the proposed program in Year 1. Describe each funding source identified in Appendix A – Table 4, and justify below the reallocation of resources. Describe the impact the reallocation of financial resources will have on existing programs, including any possible financial impact of a shift in faculty effort, reallocation of instructional resources, greater use of adjunct faculty and teaching assistants, and explain what steps will be taken to mitigate such impacts.

Once the budget is developed in consultation with the Office of Provost's Planning and Finance as well as CEC Dean's Office, this section will be completed and approved by those entities.

C. If the institution intends to operate the program as self-supporting, market tuition rate, or establish a differentiated graduate-level tuition, as described in Board of Governors Regulation 8.002, provide a rationale and a timeline for seeking Board of Governors' approval.

☒ Not applicable to this program because the program will not operate as self-supporting, market tuition rate, or establish a differentiated graduate-level tuition.

D. Provide the expected resident and non-resident tuition rate for the proposed program for both resident and non-resident students. The tuition rates should be reported per credit hour unless the institution has received approval for a different tuition structure. If the proposed program will operate as a continuing education program per Board of Governors Regulation 8.002, describe how the tuition amount was calculated and how it is reflected in Appendix A – Table 3B.

FIU's current per-credit undergraduate tuition and fees are $205.57 for residents and $618.87 for non-residents, resulting in a total program cost (4 years/120 credits) of $24,668 (resident)/$74,264 (non- resident). In addition, per-semester fees include $10 for intercollegiate athletics, $93.69 for student health services, and $95.13 for transportation access. Depending on the number of semesters in which a student is enrolled, total per-semester fees will vary. For example, a four-year enrollment will include 8 semesters at the cost of $1,591 in per-semester fees (source, FIU 2023-2024 Undergraduate Catalog).

E. Describe external financial and in-kind resources available to support the proposed program and explain how this amount is reflected in Appendix A – Table 3A or 3B.

This undergraduate program will be funded solely from Education and General sources.

VIII. Self-Supporting and Market Tuition Rate Programs

Note: Skip this section If the proposed program will not operate as a self-supporting or market tuition rate program.

Proposed Program Type

☐ Market Tuition Rate Program

- **☐ Online**
- **☐ Continuing Education**

☐ Self-Supporting Program

☒ N/A

A. Provide supporting documentation in a separate attachment that serves as evidence that the new program will not supplant any existing similar or equivalent E&G degree offering. Describe the evidence in narrative form below. *Note that Board Regulation 8.002 considers a program similar if it is offered under the same CIP code as one funded under the E&G budget entity.*

B. If the proposed self-supporting or market tuition rate program will be a track under an existing E&G program or has a similar existing E&G program, provide a side-by-side tuition and fee comparison in the table below. Provide a link to the university's website that provides students with information about financial assistance and obligations for repayment of loans for these programs.

☐ Not applicable because the program will not be a track under an existing E&G program or is not similar to an existing E&G program.

Tuition and Fee Comparison

E&G Track or Program	Proposed Program

C. Explain whether the program leads to initial licensing or certification in occupational areas identified as a state critical workforce need. If so, which licenses and certifications will graduates receive upon completion, and explain why implementing the program as self-supporting or market tuition rate is the best strategy to increase the number of graduates in the state.

Note: Questions D – M pertain only to market tuition rate programs. If the proposed program will be self-supporting, skip to Section IX.

D. Explain the process used to determine the proposed market tuition rate and provide the tuition of similar programs offered by other SUS institutions and private institutions as appropriate so that the tuition of at least five similar programs is provided. If the proposed tuition rates differ for resident and non-resident students, explain why.

E. Explain how offering the proposed program at a market tuition rate is aligned with the university's mission. If the program qualifies as a Program of Strategic Emphasis, provide additional justification for charging higher tuition for the proposed program.

F. Provide a declaratory statement that offering the proposed program at the market tuition rate does not increase the state's fiscal liability or obligation.

G. Explain any proposed restrictions, limitations, or conditions to be placed on the program.

H. Explain how the university will ensure sufficient courses are available to meet student demand and facilitate program completion.

I. If applicable, provide a baseline of current enrollments, including a breakout of resident and non-resident enrollment in similar courses funded by the E&G budget entity.

J. Describe any outcome measures that will be used to determine the program's success.

K. List the campuses and/or sites at which the proposed program will be offered. If the program is only offered online, indicate that, and provide the location from which the program will be managed.

L. Provide an estimate of the total and net annual revenue the university anticipates collecting for Years 1 and 5 if the proposal is approved. This information should be consistent with the data provided in Appendix A – Table 3B, which is required as a part of this proposal.

M. Describe how revenues will be spent, including whether private vendors will be utilized and for what purpose. Additionally, identify all budget entities used for the program.

IX. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5 below, including but not limited to the following:

- **the total number of volumes and serials available in the discipline and related disciplines**
- **all major journals that are available to the university's students**

The Library Director must sign the additional signatures page to indicate they have reviewed Sections IX.A. and IX.B.

The existing Library resources are sufficient to support the Bachelor of Science in Data Science and Artificial Intelligence. The general collections budget of the University Libraries for the 2022-2023 fiscal year was $7.55 million. The combined holdings of the FIU University Libraries consist of over 2 million books, including over 389,000 electronic books, and access to over 157,000 serial titles in print or online. Over 650 databases are available, including indexes, fulltext journal articles, videos, newspapers, and archival content. The library also holds substantial collections of federal, state, local, and international documents.

The Library maintains multiple demand-driven electronic book acquisitions, which are fairly comprehensive in the both the sciences and computer science. Through these plans the library receives academic and professional-level titles in the social sciences and humanities published in the U.S. and U.K.

In terms of both monographs and journals most likely to be relevant to this program's offerings, the Library's Discovery Service reports the following subject area counts for monographs:

- Statistics 48,395
- Biology 40,951
- Physics 40,419
- Artificial Intelligence 14,224
- Calculus 8,344
- Application Software 4,923
- Computer Communication Networks 4,037
- Data Mining 3,306
- Data Mining and Knowledge Discovery 2,296

Online Journal content can be accessed from the Library's Discovery Service or through E-journal portal, BrowZine. Although many of the online journals are available cover-to-cover, some titles may only have selective content available through aggregator databases. The library has cover-to-cover subscriptions to titles in the following electronic journal packages of importance to the proposed degree, the counts for which supplement the above totals: JSTOR, Academic Search Complete, ASCE Library, ACS Publications, ACM Digital Library (includes Computing Reviews), IEEE/IET Electronic Library, Elsevier ScienceDirect, Springer, Wiley Online Library, Compendex, Applied Science & Technology Source, and Sage. Specific to this degree the Library also subscribes to: Lecture Notes in Computer Science, SpringerLink, Elsevier AccessScience, Wiley Online Library, MIT Press Journals, T&F STMnetBase.

The library's collections of databases and other online resources, over 650 in number. Subscribed databases in Computer Science and Engineering include: ACM Digital Library (includes Computing Reviews and the ACM Guide to Computing Literature), IEEE Xplore, Scopus, Web of Science, Applied Science and Technology, Engineering Village (includes Engineering Index/Compendex and INSPEC), ProQuest SciTech Premium Collection, MathSciNet, Gale OneFile: Computer Science.

FIU's access to the following online series includes conference proceedings: ACM Digital Library, IEEE/IET Electronic Library, and Springer's Lecture Notes in Computer Science, including the subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics.

B. Discuss any additional library resources needed to implement and/or sustain the program through Year 5. Describe how those costs are reflected in Appendix A – Table 3A or 3B.

☒ Not applicable to this program because no additional library resources are needed to implement or sustain the proposed program.

C. Describe any specialized equipment and space currently available to implement and/or sustain the proposed program through Year 5.

The SCIS offices are housed in the Computing, Arts, Science and Education (CASE) and PG6 Tech Station buildings of the Modesto A. Maidique Campus. Both CASE and PG6 buildings house the over 40 faculty and 20 staff members of the School. The location of SCIS faculty offices in close proximity to classrooms and teaching and research labs, and co-location with SCIS technical and office support groups has greatly enhanced delivery of the SCIS mission. There are three primary offices of the school: Undergraduate Office (CASE 3rd Floor East Wing), Graduate Office (CASE 3rd Floor West Wing), and the Undergraduate Student Advising Center (PG6 1st floor). The location, as well as the functionality and aesthetics of faculty offices, has been a significant contributor to the ability of the SCIS to attract high caliber faculty, to collegiality within the SCIS, and to high morale of the SCIS faculty. The SCIS Technology group's offices are on the 2nd floor in close proximity to the research and open labs they service.

The SCIS Director's office is located in Graduate office area, which is in the same wing as research faculty and the Graduate Program Director. The Associate Director's office is located in the Undergraduate office area, and is in the same wing as the instructional faculty. The Associate Director also serves as the School's Undergraduate Program Director. Both offices have secretarial staff assigned to assist with each respective program, as well as, staff to manage business operations. The Undergraduate Advising Center houses the Assistant Director for Advising and the advising staff. All offices are well accommodated with desk, chairs, desktop computer, storage cabinet and whiteboard. All offices have an IP-based phone, a network connection and WiFi access. The typical faculty/staff office will have one or two 22 or 24" displays, a Dell Precision 1700 with Intel i7-4770, 16GB ram, 256 GB SSD, Nvidia K600 1GB video card or a similarly configured Intel based Mac system unless a different specification is needed to meet a specialized research or instructional requirement. Hardware and software are maintained by SCIS Technology Group are regularly updated based on a refresh cycle established by the School. Teaching assistants may reserve meeting rooms in ECS or PG6 for one-on-one or group mentoring sessions.

All KFSCIS faculty offices are located on the 2nd and 3rd floors of the Computing, Arts, Science and Education building (CASE) on the Modesto A. Maidique main campus. The strategic location of SCIS faculty and administrative offices on the main campus of the university, in proximity to other academic units such as College of Medicine, and Departments of Physics, Biological Sciences, and Mathematics and Statistics, has been a principal contributor of the ability of SCIS to further its goal as an enabler of multidisciplinary education and research in FIU. Delivery of service courses, in support of another of its mission components, and the ability to promote vibrant student organizations and faculty mentorship of SCIS students is immeasurably facilitated by the strategic location of SCIS offices.

The School of Computing and Information Sciences (SCIS) operates an instructional classroom lab known as the Ilab. The Ilab, located in CASE 141, consists of (48) Dell Precision T1600, Dual Core i3-2100 (2nd gen) 3.1 ghz, 1gb nVidia Quadro 600, 8gb, 250gb hdd, 16x dvd rw, P2210 display. These systems run Windows 7 and a variety of software development tools like Netbeans and Eclipse. Instructors can use a wired workstation in the room or connect their laptops to the presentation console that controls the room's computer display projectors. In PG6 Tech Station the school operates an Advanced Systems Training Lab. The lab consists 49 Dell workstations configured with an Intel Core i7-4790, 16 GB DDR3, Nvidia Quadro K620 2GB and 22" HD display and 256 GB Solid State Drive. Instructors can record lectures in both training labs, edit and publish class videos or stream the live lectures using the systems live streaming feature. Students access videos via the web or using native software for Andriod or iOS.

The SCIS co-operates seven instructional media classrooms with University Technology Service, Media Services group in the CASE building first floor, east wing. Each classroom is equipped with a networked computer, computer data projector, and projection screen. Faculty can use a laptop to connect to the projector via a dedicated video cable. Similarly, the School utilizes four multi-media classrooms of varying size (35-175 seats) in PG6 Tech Stations. The Tech Station classrooms are reserved for STEM related discipline use.

Adequacy: The SCIS Director for Technology is responsible for the operation and maintenance of the computing equipment. The SCIS Associate Director evaluates the classroom equipment and lab environment provided to determine educational fitness for purpose. The SCIS Director for Technology, in consultation with the SCIS Infrastructure committee, SCIS Director and Associate Director purchases classroom and lab equipment. The SCIS Technology Group receives faculty requests to install software in the classroom and/or lab to support curriculum needs. SCIS Faculty and students report technical problems to the Technology Group staff via an email-based trouble ticket system. The SCIS Director for Technology reviews all service requests, evaluates service performance, and makes periodic reports to the SCIS Director and Associate Director on any issues concerning classroom operation.

The School of Computing and Information Sciences operates six laboratories and numerous study rooms for use by its undergraduates in Computer Science and Information Technology programs. Each lab computer contains a standard Windows 7 image that contains the necessary instructional support software.

CASE 241 - John C. Comfort Collabrium – Open Lab hours: 24 hours, 7 days a week.

- (48) Dell Precision T1700, 8 Core i7-3770 3.4ghz, 16gb ram, 256gb ssd hdd, nVidia Quardo 600, 1gb to desktop, 16x dvd rw single 24in display

CASE 237 - Advanced Undergraduate Lab – Open Lab hours: 24 hours, 7 days a week.

- (11) Apple iMac 27, Quad Core i5 3.2ghz, 16gb ram, 256gb ssd hd, NVIDIA GeForce GT 755M
- (2) Apple iMac 27, Quad Core i5 2.9ghz, 16gb ram, 256gb ssd, NVIDIA GeForce GTX 600M
- (11) Dell Precision T1700, QuadCore i7-4770 3.4ghz, 16gb ram, 256gb ssd hdd, nVidia Quardo 600, 1gb to desktop, 16x dvd rw single 24in display or dual 22in display
- (2) Samsung 40in displays for group collaboration
- (2) Standing, height adjustable desks with single 24" displays for collaboration

CASE 235: Seminar Room – Available for reservation: 9am – 5pm.

- This multimedia enabled lecture room provides up to 25 seats for student groups to use to solve in class assignments. The room contains lecture recording and streaming capabilities via Sonic Foundry MediaSite.

CASE 237a: Tutorial Lab – Open lab time vary based on T/A and student group tutoring schedule.

- (4) Apple iMac 27, Quad Core i5 2.9ghz, 16gb ram, 256gb ssd, NVIDIA GeForce GTX 600M
- This room also contains data projection and flexible seating for instructors and students to hold ad-hoc tutoring.

PG6 105: The Advanced Systems Training Lab – Closed lab available during scheduled course times.

- 49 Dell workstations configured with an Intel Core i7-4790, 16 GB DDR3, Nvidia Quadro K620 2GB and 22" HD display and 256 GB Solid State Drive.
- Students use these systems to complete in-class assignments and receive state-of-the-art systems training.

PG6 106: The Software Design lab -- Closed lab available during scheduled course times.

- The lab provides 24 Dell workstations system equipped as above with upgraded 29" HD wide screen display, ideal for software development requirements. The WiFi supported open meeting areas for students provides a convenient place to complete course work or have a group meeting.

PG6 102: IT Hardware and Services lab -- Closed lab available during scheduled course times.

- The lab provides technology students hand-on skills training on a variety of computing equipment/tools to integrate hardware and software systems. Students working in pairs using specialized hardware tools to manipulate motherboards, power supplies, interface cards, RAM, hard drives and other computing components. The lab has 3D printing capabilities to manufacture cases and other parts needed. At each of the 13 work benches there is a Dell workstation (as specified in PG6 105) to use for reference during a lab activity. The lab also contains Cisco routers, switches and KVMs necessary to manage WANs and other network systems which can support ad-hoc networking instruction.

PG6 101 Suite: Team Rooms -- Available for reservation by students at the Advising office

- The five Team and conference room provides collaboration support for courses where student teams are developing large projects and provide a relaxed environment for peer study group sessions. Each room contains a 70" HD LCD Display which uses a Crestron system to wirelessly and simultaneously display the output of up to four devices, that are running either Windows, Mac OS, Android or iOS.

The SCIS has dedicated servers for student files and/or computing service. Each student is given a default file storage quota of 25 GB of file storage space which can be increased based on instructor feedback. Available for instruction is a virtual node computing system hosted on multi-core servers, utilizing VMware, Xen and Virtual box for virtualization. Students can login remotely into several Linux and Solaris file and computer servers. The lab provides students tables to utilize their own laptops, large LCD displays where students can connect their laptops to collaborate with others, and connect to the campus network via campus WiFi services.

University Technology Services (UTS) – General Computing Labs

There are 10 general computing labs open to all students of the university and managed by UTS. These labs are located available 8am – 11pm, Monday through Thursday, 8am – 6pm on Friday, 9am to 6 pm on Saturday. The labs are located on the Modesto Maidique Campus, Engineering Center and Biscayne Bay Campus. Each lab contains at least 20 Intel or AMD based desktops computers running Windows and/or Mac OS.

Internet access is available from all FIU student residence halls, off-campus access is available via private ISP to Linux/Unix student file systems and computer servers 24/7 via ssh, sftp or scp.

In addition, students may receive free software to assist them with their instructional and home computing environment. Via the Microsoft DreamSpark students receive Visual Studio.NET, MS SQL Server, IIS Server and other OS/Desktop products. Microsoft Office Suite is available from FIU's Microsoft Campus Office agreement. McAfee Antivirus software is available to all students to help students maintain a safe personal computing environment.

D. Describe any additional specialized equipment or space needed to implement and/or sustain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Appendix A – Table 3A or 3B. Costs for new construction should be provided in response to Section IX.E. below.

☒ Not applicable to this program because no new I&R costs are needed to implement or sustain the program through Year 5

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. Appendix A – Table 3A or 3B includes only I&R costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase due to the program, describe and estimate those expenses in narrative form below. High enrollment programs, in particular, are expected to necessitate increased costs in non-I&R activities.

☒ Not applicable to this program because no new capital expenditures are needed to implement or sustain the program through Year 5.

F. Describe any additional special categories of resources needed to operate the proposed program through Year 5, such as access to proprietary research facilities, specialized services, or extended travel. Explain how those projected costs of special resources are reflected in Appendix A – Table 3A or 3B.

☒ Not applicable to this program because no additional special categories of resources are needed to implement or sustain the program through Year 5.

G. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5 and explain how those are reflected in Appendix A – Table 3A or 3B.

☐ Not applicable to this program because no fellowships, scholarships, and/or graduate assistantships will be allocated to the proposed program through Year 5.

In Year 5, 1.5 TAs (Teaching Assistants) are budgeted to assist faculty with large sections of required courses. The cost of the TAs is included under the OPS category in Appendix A Table 3A.

X. Required Appendices

The appendices listed in tables 1 & 2 below are required for all proposed degree programs except where specifically noted. Institutions should check the appropriate box to indicate if a particular appendix is included to ensure all program-specific requirements are met. Institutions may provide additional appendices to supplement the information provided in the proposal and list them in Table 2 below.

Table 1. Required Appendices by Degree Level

Appendix	Appendix Title	Supplemental Instructions	Included Yes/No	Required for Degree Program Level		
				Bachelors	Masters/ Specialist	Doctoral/ Professional
A	Tables 1-4		Yes	X	X	X
B	Consultant's Report and Institutional Response		No			X
C	Academic Learning Compacts	Include a copy of the approved or proposed Academic Learning Compacts for the program	Yes	X		
D	Letters of Support or MOU from Other Academic Units	Required only for programs offered in collaboration with multiple academic units within the institution	Yes	X	X	X
E	Common Prerequisite Request Form	This form should also be emailed directly to the BOG Director of Articulation before submitting the program proposal to the Board office for review.	Yes	X		

F	Request for Exemption to the 120 Credit Hour Requirement	Required only for baccalaureate degree programs seeking approval to exceed the 120 credit hour requirement	No	X		
G	Request for Specialized Admissions Status	Required only for baccalaureate degree programs seeking approval for specialized admissions status	No	X		
H	Attestations for Self-Supporting and Market Tuition Rate Programs	Required only for self-supporting or market tuition rate programs	No		X	X
I	Faculty Curriculum Vitae		Yes	X	X	X

Table 2. Additional Appendices

Appendix	Appendix Title	Description