FAU
BOARD OF TRUSTEES
Florida Atlantic University

Item: AS: A-3

COMMITTEE ON ACADEMIC AND STUDENT AFFAIRS

Tuesday, June 4, 2019

SUBJECT: REQUEST FOR APPROVAL OF A NEW DEGREE PROGRAM - CIP 11.0102

PROPOSED COMMITTEE ACTION

Request for approval of the following New Degree Program – CIP 11.0102:

- Master of Science in Artificial Intelligence

BACKGROUND INFORMATION

The proposed program is a Master of Science in Artificial Intelligence (MSAI). The program will be administered by the Department of Computer and Electrical Engineering and Computer Science (CEECS) in the College of Engineering and Computer Science (COECS) at Florida Atlantic University (FAU). The program offers both thesis and non-thesis options. There are no other concentrations, tracks, or specializations. Both thesis and non-thesis options require a minimum of 30 credits.

Artificial Intelligence (AI) has become more and more important in our daily life. Locally and nationally the demand for AI professionals has increased exponentially in recent years. The graduates of the MSAI program will fill employment needs at both local and national levels. This degree will prepare students for careers in various education, government and industry positions that require AI skills. Potential jobs include political data scientists, survey statistician, research analyst, intelligence data analyst, quantitative social scientist, software engineers, research analysts and solution architects. There are no similar programs in the FLSUS.

IMPLEMENTATION PLAN/DATE

Effective Fall 2019, pending approval by the Florida Atlantic University Board of Trustees.

FISCAL IMPLICATIONS

The faculty staffing in the department is sufficient to initiate the program. The faculty salary and benefits needed to support this program will come entirely from reallocated base E&G funds. For Year 1, the budget includes $224,045 in funds reallocated from the department to fund faculty salaries and benefits for the current faculty members in the program. The reallocated salaries and benefits extend into the fifth year and include any increases in percent effort for current faculty for a total of $326,387 for Year 5.

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

Board of Governors, State University System of Florida

Request to Offer a New Degree Program

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

Florida Atlantic University	**Fall 2019**
University Submitting Proposal	**Proposed Implementation Term**
College of Engineering and Computer Science	**Computer and Electrical Engineering and Computer Science**
Name of College(s) or School(s)	**Name of Department(s)/ Division(s)**
Artificial Intelligence	**MS in Artificial Intelligence**
Academic Specialty or Field	**Complete Name of Degree**
11.0102	
Proposed CIP Code	

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

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

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

Implementation Timeframe	Projected Enrollment (From Table 1)		Projected Program Costs (From Table 2)				
	HC	FTE	E&G Cost per FTE	E&G Funds	Contract & Grants Funds	Auxiliary Funds	Total Cost
Year 1	20	16	16,322	261,144			261,144
Year 2	25	21					
Year 3	30	25					
Year 4	35	27					
Year 5	40	30	13,165	394,950			394,950

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

INTRODUCTION

I. Program Description and Relationship to System-Level Goals

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

1. The proposed program is a Master of Science in Artificial Intelligence (MSAI). The program will be administered by the Department of Computer and Electrical Engineering and Computer Science (CEECS) in the College of Engineering and Computer Science (COECS) at Florida Atlantic University (FAU).
2. The program offers both thesis and non-thesis options. There are no other concentrations, tracks, or specializations.
3. Both thesis and non-thesis options require a minimum of 30 credits.
4. Artificial Intelligence (AI) has become more and more important in our daily life. Locally and nationally the demand for AI professionals increases exponentially in recent years. The graduates of the MSAI program will fill in the needs both in the local and national level.

B. Please provide the date when the pre-proposal was presented to CAVP (Council of Academic Vice Presidents) Academic Program Coordination review group. Identify any concerns that the CAVP review group raised with the pre-proposed program and provide a brief narrative explaining how each of these concerns has been or is being addressed.

The pre-proposal was presented to the CAVP on February 22, 2019. There were no concerns regarding the proposed degree of MS in Artificial Intelligence. We received several positive comments about the importance of this degree and the high level of demand that would exist. In addition, there were comments about FAU being well-positioned and well-suited to provide this degree.

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

N/A

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

The proposed MS in Artificial Intelligence program supports and aligns with the current SUS Strategic Planning Goals. The Strategic Plan 2012 - 2025 emphasizes teaching, research, and public service, with the following priorities: Excellence, Productivity, and Strategic Priorities for a Knowledge Economy.

Excellence
The proposed MS in Artificial Intelligence is a high-quality program where experts in the field will train students in a transformative discipline that will change the way the society

works. This program will contribute to a workforce with the skills needed to harness the potential benefits of AI. The high quality of the program consists of (1) a strong curriculum, consisting in a foundation of AI that includes theory, methods and technologies, combined with major subfields of vision, data analytics and algorithms, knowledge management and reasoning, machine learning, and applications; (2)high quality research (i.e. thesis option) supervised by experts in the field; and (3) facilities, such as the Artificial Intelligence and Deep Learning Laboratory, which will serve as a training platform to support graduate student teaching and research.

Productivity
One of the main priorities of SUS Strategic Planning Goals is to award more degrees in the high demand programs in STEM disciplines. The newly proposed MS in Artificial Intelligence programs aligns very well with this priority. FAU will produce graduates which possess the skills and knowledge needed to be competitive in the AI field.

Strategic Priorities for a Knowledge Economy
The objective of this priority is to promote STEM programs with critical and/or development needs or emerging technologies that address both the workforce and student demand. Over the past ten years, there has been a dramatic progress in the rise of artificial intelligence and in its use in the development of systems that can reason and respond to increasingly complex situations. AI is everywhere and the change brought about by these technologies has just begun. AI is transforming every segment of American industry. It is making agriculture more precise and efficient, new medical technologies, and the prospect of autonomous transportation and advanced manufacturing close to reality. The effects of AI are expected to be profound. To become competitive, the companies will have to embrace AI to some extent. MSAI program will contribute in creating an educated workforce, one of the most diverse student bodies in the SUS system.

FAU Strategic Plan for Race to Excellence 2015 - 2025
The MS in Artificial Intelligence program aligns with the vision of FAU which includes an excellent graduate education and high quality programs in areas of strategic emphasis (STEM areas). The programs will support focal areas, known as Pillars and Platforms. All pillars (Healthy Aging; Neuroscience; Ocean Science and Engineering/Environmental Sciences; Sensing and Smart Systems) are expected to adopt AI methods and technologies to stay competitive. Among the platforms, the Big Data Analytics is one of the major subfields of AI. The MSAI program will also support platforms such as Community Engagement and Economic Development, Global Perspectives and Participations, and Innovation and Entrepreneurship.

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

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

for inclusion.

The Programs of Strategic Emphasis Categories:

1. Critical Workforce:
    - Education
    - Health
    - Gap Analysis
2. Economic Development:
    - Global Competitiveness
3. Science, Technology, Engineering, and Math (STEM)

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

Critical Workforce

Students after completing the MSAI program will become skillful AI professionals, meeting the critical workforce needs of the South Florida Region, Florida State and beyond.

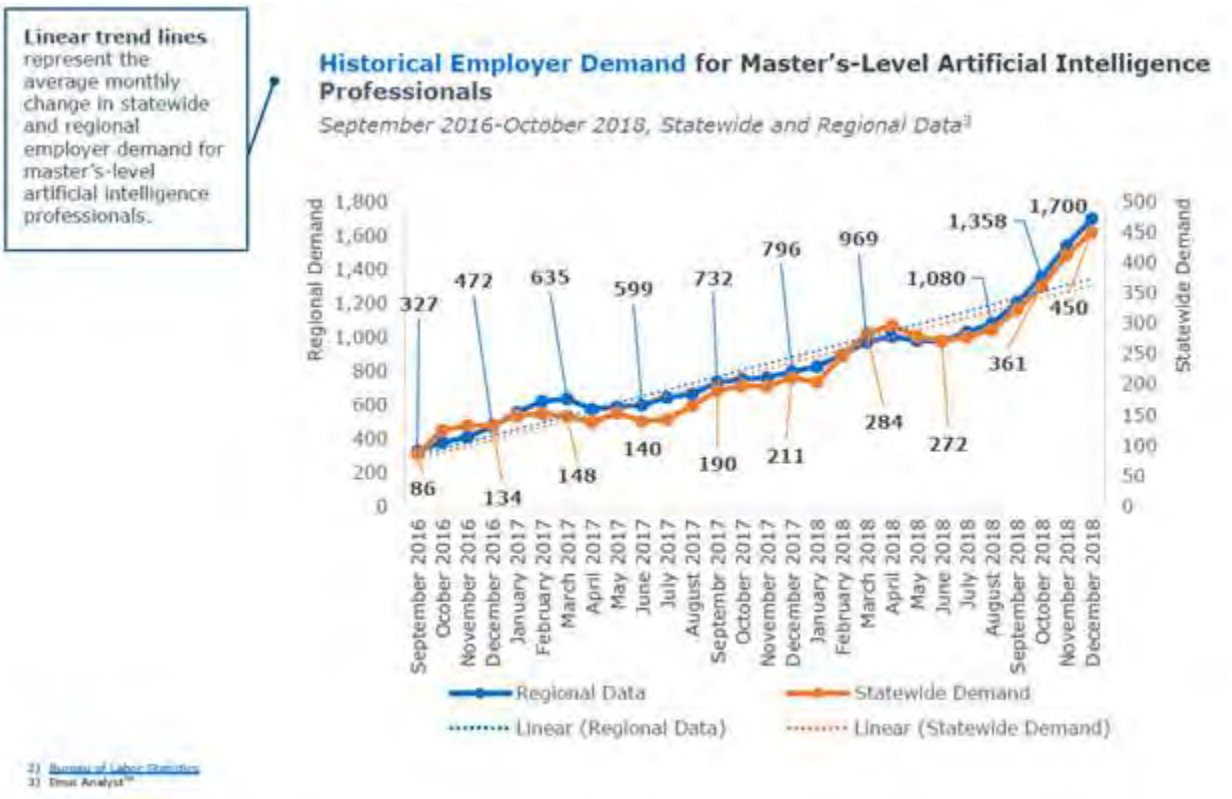
Global Competitiveness

Florida Atlantic University offers a number of Ph.D. programs, and participating faculty are active in research and teaching. Faculty are world class leaders in Artificial Intelligence, Machine Learning, Data Mining, Autonomous Vehicles, among other things. The university supports a combination of academic research and collaboration with for-profit partners, with the goal of developing products which are competitive in global markets. In addition,
South Florida in general is a highly populated, highly developed area with small businesses and innovative and technologically advanced companies. FAU has received multiple competitive research grants from National Science Foundation, the Defense Advanced Research Projects Agency and other Federal funding agencies in the area of AI and Machine Learning. FAU is home to the NSF Big Data Training and Research Laboratory and a NSF AI and Deep Learning Training and Research Laboratory. In short, research related to AI at FAU is prominent locally and globally.

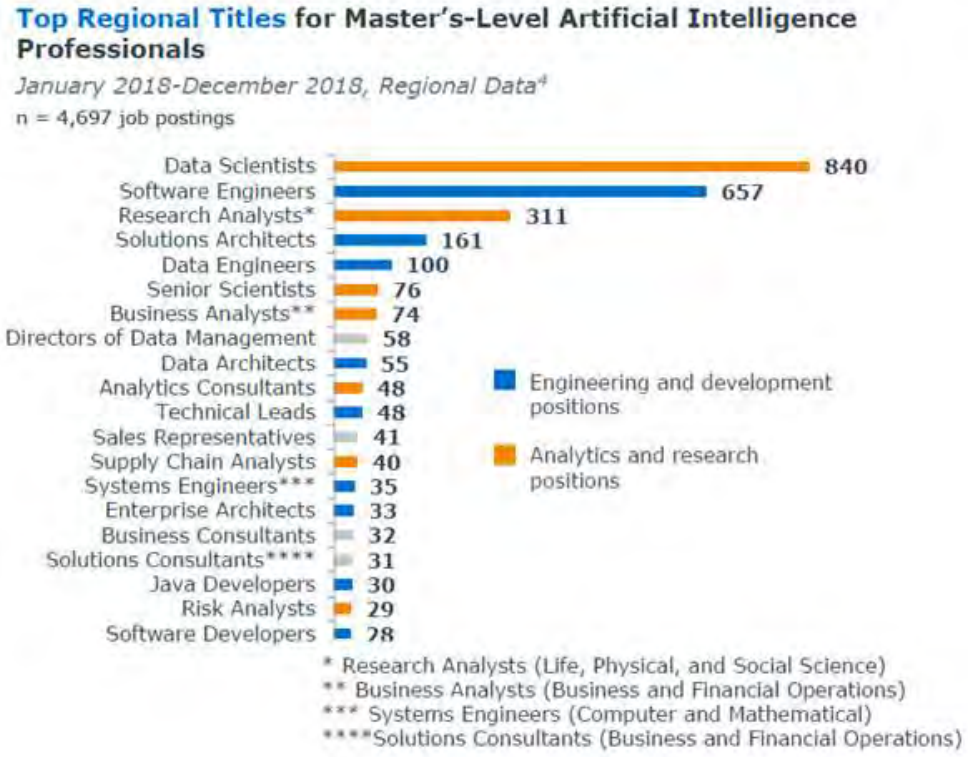
Science, Technology, Humanities, Engineering, and Math (STHEM)

The MSAI program offers coursework and laboratory training at the graduate level will enable its graduates to enter Florida's workforce with the capabilities to fill emerging needs. This addresses more than STEM development in "Sciences and Technology" as identified in the Programs of Strategic Emphasis.

Figure below partially shows historical employer demand for MSAI professionals (EAB Market Research Brief, 2018).



This degree will prepare students for careers in various education, government and industry positions that require AI skills. Potential jobs include political data scientists, survey statistician, research analyst, intelligence data analyst, quantitative social scientist, software engineers, research analysts and solution architects (see the figure below (EAB Market Research Brief, 2018).



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

The program will be offered at the main campus in Boca Raton, Florida. The courses are expected to be offered both in-person and using the distance learning option. Therefore, students will be able to complete the program by attending the courses in person or remotely through distance learning.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

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

Locally, startups and established companies have difficulties to recruit AI professionals. Nationally, not just the economical side but also the security side, the US needs invest heavily in AI to be competitive. Other countries spend billions of dollars in AI research and education. Increased employer demand for master's-level AI professionals indicates an opportunity for the program development. Data collected by EAB Global indicates that the state-wide demand for such professionals increased 423 percent (from 86 to 450 postings (EAB Market Research Brief, 2018). Reported high earnings in relevant occupations will attract prospective students to the program. AI-related professionals earn a median hourly income of $46 state-wide, which is way higher than a median income of $16 per hour across all professionals in the state.

South Florida is home to many startups and large companies with demands of developing smart devices and products. Recently, a number of local companies such as Magic Leap, Cendyn, and Florida Power and Light Company came to FAU to seek AI professionals. The program will produce AI professionals serving not only South Florida and the State, but also the US. The graduates of the MS program will be able to contribute to meet the needs of these employers. This will have a positive impact to the local economy.

Federal funding agencies such as NSF, NIH, DARPA and ONR have provided numerous opportunities in AI and its related areas. These funding opportunities have helped the US capitalize on the full potential of AI to strengthen our economy, better our society, and improve our national security (NSF, 2018). The proposed master's program will attract like-minded faculty and students who are passionate about AI and its applications. It is anticipated that more competitive proposals will be written by the AI faculty with the help of the student body.

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

We conducted a survey among both undergraduate and graduate students in the Department of Computer and Electrical Engineering and Computer Science at FAU. 96.7% of surveyed students agree that a Master of Science in Artificial Intelligence

program will be beneficial to society in general and the FAU community in particular. Other key elements indicating that students will be interested in the proposed program are:

1. Increased employer demand for master's-level AI professionals indicates an opportunity for the program development. Data collected by EAB Global indicates that the state-wide demand for such professionals increased 423 percent (from 86 to 450 postings).
2. Reported high earnings in relevant occupations will attract prospective students to the program. AI-related professionals earn a median hourly income of $46 state-wide, which is way higher than a median income of $16 per hour across all professionals in the state.
3. Nationally, less than 10% of students in the field closely related to AI are black, and similarly for woman and Hispanic population. By encouraging minority and women students to pursue the MS study, FAU will produce more AI professionals who are minority and women.

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

There is no similar program in the SUS.

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

We projected student headcount is 20 in the first year, with an increment of 5 students over the next 4 years. Students enrolled in other programs are expected to change program only during the first 2 years of offering this program. Most of the students expected to enroll in this program are students that graduated with a bachelor's degree in the College of Engineering and Computer Science at FAU, and students with bachelor's degree in other disciplines at FAU and at other SUS institutions. A number of working professionals are expected to enroll in this MS program to advance their professional career. Some other populations of students are public and private local institutions, as well as national and international institutions.

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

Graduate students are drawn from local, statewide, out-of-state and international populations. Under-represented minorities (URM) will be well represented as FAU is the

most ethnically diverse institution in the State of Florida (29th nationwide). Minorities currently make up 44.83% of the FAU enrollment, and FAU is designated by the DOE Office of Postsecondary Education as a minority serving institution. Indeed, of the 29,606 students enrolled at FAU (all colleges) in Fall 2018 whose ethnicity was known, 12,574 were white and 13,376 were URM. Over the last five years, black and Hispanic enrollments have increased more than that of any other groups; FAU's student body will soon be a "majority minority" mirroring the predicted demographic composition of the USA in the near future. Thus there is already a large and diverse pool of students from which this program can recruit. Approximately 33.22% of graduate students in related programs belong to underrepresented minority groups. This number continues to grow each year and we assume that it will eventually reach numbers similar to the undergraduate distribution of 46.88% URM. This information was provided by FAU IEA office and approved.

III. Budget

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

The faculty staffing in the department is sufficient to initiate the program. The faculty salary and benefits needed to support this program will come entirely from reallocated base E&G funds. For Year 1, the budget includes $224,045 in funds reallocated from the department to fund faculty salaries and benefits for the current faculty members in the program. The reallocated salaries and benefits extend into the fifth year and include any increases in percent effort for current faculty for a total of $326,387 for Year 5. See Table 4 for a complete listing of faculty involved with the program.

Reallocated base funding is also being used to cover one AMP Budget Coordinator position at 5% effort ($4,404) to support the overall administrative functions of the program; and one USPS Graduate Programs coordinator position at 15% effort in Year 1 ($9,695) and 25% effort by Year 5 ($16,159) based on the anticipated growth in student enrollment.

The Department currently receives 35 graduate teaching assistantships for full-time students. Funding for one position would be reallocated in Year 1 to support this program ($18,000). By Year 5, we anticipate the number of GTAs to increase to two based on the projected full-time enrollment ($36,000).

Expenses in Table 2 ($5,000 in year 1; $12,000 in year 5) include computers/printers, copier, phones, postage, printing, travel, office supplies, information technology supplies, and specialized software. An allocation for recruiting (brochures, travel, etc.) is also requested to be able to attract new students from outside universities as well as agencies and industry in our service areas. This proposed program is a priority for the College such that funding will be reallocated to match the university/College priorities.

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

N/A

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

None of the programs will be impacted by a reallocation of resources for the MS in Artificial Intelligence program. The undergraduate programs will not be affected at all. All graduate courses are taught by graduate faculty in the College of Engineering and Computer Science, mainly from the CEECS department. Only 2 new graduate courses have been added as part of this proposal, a core course and an elective course. Both courses will attract other graduate students in the college and can be taken as electives in other programs. The courses already existent will benefit from the new program MS in Artificial Intelligence, as they are expected to increase their enrollment. These courses are offered both live and distance learning. The 3 core courses will be offered at least once every year. The proposed curriculum has a rich variety of courses listed as electives (i.e. 21 elective courses), thus the enrolment increase per course is not expected to be high. The MS in Artificial Intelligence program provides a great opportunity for students obtaining their bachelor's degree in Computer Science or related areas to continue their academic preparation and specialize into a field with great potential to transform every segment of industry.

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

There is no impact on related programs or departments. There is only one new core course added as part of this proposal (CAP 5625 Computational Foundations of Artificial Intelligence), and this course does not have any additional prerequisites. One new elective course has been added as an elective to an already rich variety of courses. No additional prerequisites are needed for this elective as well.

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

NSF invests currently over $100 million annually to support AI research (https://www.nsf.gov/news/news_summ.jsp?cntn_id=245418). NSF is supporting fundamental research to bring AI technologies to maturity and to provide new opportunities for the American workers. DARPA is funding research in AI. For example the Explainable Artificial Intelligence (XAI) program (https://www.darpa.mil/program/explainable-artificial-intelligence) are expected to enable AI systems where machines understand the context and environment in which they operate, and build models that allow them to characterize real world phenomena. Local industry (i.e. Modernizing Medicine, Magic Leap) will provide great opportunities for internships for the students in MSAI program.

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

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

It is evident from the recent development that AI is one of the foundations of many cutting-edge technologies such as data science, robotics, Internet of Things, clouding computing, cyber security and cyber-physical systems. These cutting-edge technologies in term fuel job growth in many high-tech areas. A study released by the World Economic Forum shows that Data Analysis, AI and machine learning-related jobs will be the most in demand within the next four to five years. National Academies of Science, Engineering and Medicine released a report stating advancement of AI and machine learning is crucial for the wellbeing of the nation. Many federal research funding agencies, such as National Science Foundation, National Institute of Health, and Defense Advanced Research Projects Agency, launched requests for applications in the areas of AI , Deep Learning, and their applications. These activities provide challenges and opportunities for us to produce AI professionals that meet the needs and demand of the call. The proposed program, with the available resource in the College of Engineering and Computer Science, Florida Atlantic University, will produce up 40 MSAI graduates annually after five years. These graduates will contribute their talent to generate broader economic impact on the regional and state economic development.

V. Access and Articulation – Bachelor's Degrees Only

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

N/A

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

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

N/A

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

N/A

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

N/A

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

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

The mission of the State University System of Florida is to provide undergraduate, graduate and professional education, research, and public service of the highest quality through a coordinated system of institutions of higher learning, each with its own mission and collectively dedicated to serving the needs of a diverse state and global society. The proposed MSAI program will produce AI professionals who are equipped with fundamentals of AI, data mining and analysis, and machine learning, as well as domain knowledge autonomous systems, robotics, computer vision, human machine interfacing, natural language processing, among other things. They will also gain the research and inquiry skills necessary to independently conduct research and answer questions within their area of choice. They will be well prepared with rich hands-on AI and machine learning skills to enter the high demand workforce in the era of big data and AI. The new program will thus enhance both graduate education and public service in fields important not only to South Florida but also the United States by producing graduates well situated to enter the workforce, ready to apply their skills to research, management and administrative questions related to data science and analytics. Graduates are expected to enter into higher education, government, private sector consulting positions and non-profit organizations.

The MSAI Program will also seek to provide public service through student internships with federal, state and local agencies and organizations. The internships would offer opportunities for FAU students to participate in research and monitoring efforts, learn new skills, obtain experience, and provide various types of support to local partners on research projects related AI and machine learning. Thus, the MSAI Program, its faculty and students will become a resource for local communities, government agencies, and local businesses in their efforts to find innovative solutions to problems facing coastal Florida.

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

The newly proposed program MS in Artificial Intelligence integrates well with the existing programs in the COECS, and provides a pathway of specialization for the students getting a bachelor's degree in engineering or science. CEECS department has a number of faculty conducting funded research in the AI - related areas (vision; data analytics and algorithms; knowledge management and reasoning; machine learning; and AI applications), and this represents great research opportunities for the students enrolled in the MSAI program, as well as great opportunities for advising MS theses. CEECS department has a Big Data Analytics certificate program. MSAI students that specialize in Data Analytics and Machine Learning (as result of selecting corresponding elective courses) will be eligible to receive this certificate. CEECS department has few laboratories that can be used for teaching and research in AI related areas: Artificial Intelligence and Deep Learning (AIDL) Training and Research Laboratory in Florida (Director: Dr. Hill Zhu); Big Data Training and Research Laboratory (Director: Dr. Taghi Koshgoftaar); and Bidtellect Laboratory (Director: Dr. Hill Zhu).

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

Planning Process

Date	Participants	Planning Activity
October 2018	COECS Dean , COECS Associate Dean and CEECS chair	Initial plan for a new MSAI program
October 2018	Associate Dean and Assistant Provost for eLearning	Meeting to discuss the process and request the Market Analysis
January 2019	EAB contacted FAU	EAB Market Analysis - interim report received
February 2019	EAB contacted FAU	EAB Market Analysis - final report received
February 2019	COECS Associate Dean, CEECS Chair, Senior Associate Provost for Academic Affairs	Pre-proposal submitted
February 2019	Senior Associate Provost for Academic Affairs	Pre-proposal approved by CAVP
February 2019	CEECS Faculty, CEECS Associate chair, COECS Associate Dean	Meeting to discuss curriculum
March 2019	CEECS Associate Chair, COECS Associate Dean	Develop the proposal
March 2019	CEECS GPC, College GPC, University GPC	Approval
April 2019	FAU Senate	Approval

Events Leading to Implementation

Date	Implementation Activity
February 2019	CAVP approves the pre-proposal
March 2019	Proposal preparation, syllabi for new courses developed, catalog entry developed

March 2019	Approval by the CEECS GPC, COECS GPC, and UGPC

VII. Program Quality Indicators - Reviews and Accreditation

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

The program will be hosted in the Department of Computer and Electrical Engineering and Computer Science (CEECS). The CEECS department aims to find a balance of adhering to the mathematical and scientific fundamentals of our disciplines while also following their evolution and reflecting them in our offered curriculum and student training. We emphasize critical thinking, problem solving and teamwork, and stress the significance of lifelong learning. The goals of the College of Engineering and Computer Science are to encourage young people to consider careers in engineering and computer science by introducing them to these fields while in middle and high school; to prepare graduates in ways that provide them a basis for lifelong personal and professional development and that enable them to exercise leadership and make lasting contributions in their disciplines; to continue on new roads of research and discovery in its existing areas of expertise, in emerging disciplines and in related interdisciplinary areas; to provide the educational resources that working professionals need to keep pace with developments in their field; and to magnify its positive impact in serving regional, state, national and global needs by building mutually beneficial linkages with business, industry, state colleges, K-12 programs and schools and other constituencies. The CEECS department offers two programs related to the proposed MSAI program: Master of Science in Computer Science (MSCS), and Master of Science in Computer Engineering (MSCE). Both programs are accredited by the Southern Association of Colleges and Schools (SACS) Commission on Colleges. The programs are also reviewed regularly by the Board of Governors. No serious concerns were raised during the last visit. Recommendations include reducing teaching loads of untenured faculty and improving the output of faculty research and scholarly work. Since then, the teaching loads of untenured faculty members have been drastically cut (from 2 plus 2 to 1 plus 1) and new departmental and college research initiatives have been launched.

VIII. Curriculum

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

AI is transforming every segment of industry, thus enhancing the lives of all people. Students in the MSAI program will understand how artificial intelligence works, by combining data with fast, iterative processing and intelligent algorithms, allowing the software to learn from patterns or features of the data. Students will have a broad understanding of the theories, methods and technologies which lay the foundation of artificial intelligence, and will get the opportunity to take courses in major AI areas of specialty: vision, data analytics and algorithms, knowledge management and reasoning, machine learning, and AI applications.

Student Learning Outcomes (SLO) - Master of Science in Artificial Intelligence
SLO1: Students master advanced knowledge in Artificial Intelligence
Students in the MSAI program will master advanced knowledge in AI through courses, term projects, algorithms, software assignments, and oral presentations of the class projects. The core courses provide the foundation for AI techniques. Students will then take classes

from specialty groups: vision, data analytics and algorithms, knowledge management and reasoning, machine learning, and AI applications.

Implementation Strategy
Instructors design lectures and assignments aiming at improving students' mastery of advanced knowledge in their fields of study.

Assessment Method
Document and analyze students' work in terms of their understanding and mastery of knowledge in the fundamentals of AI and machine learning as well as applications. Instructors of the courses in the program offered in each academic year will document and assess students performance quantitatively and qualitatively through homework, tests, and class projects (among other things) in terms of students theoretical, analytical, and design skills.

SLO2: Students conduct independent research and or scholarly work in the areas related to the Artificial Intelligence discipline
Students enrolled in the thesis option will conduct original research, write and defend a thesis. The thesis students will demonstrate (1) the ability to survey the scientific literature; (2) the ability to develop a hypothesis, design algorithms, implement them, conduct scientific experiments and simulations, and draw conclusions; (3) the ability to analyze the complexity of the algorithms; (4) the ability to write a scientific thesis; and (5) the ability to communicate effectively during the thesis presentation.
Students interested in getting engaged in research can enroll in a research-oriented Directed Independent Study (DIS), for the duration of a semester. This represents an opportunity to get involved in research in AI related areas under the supervision of a professor working in this field.

Implementation Strategy
The evaluation of the thesis will be conducted by the thesis committee members, following the guidelines of the CEECS department. A digital copy of the thesis will be made available to the whole department at least 1 week before the defense. The committee members will carefully review the manuscript and provide feedback. The committee members will attend the defense presentation, which is opened to the university at large and to the public. The DIS will be evaluated by the professor supervising the DIS.

Assessment Method
Each member of the MS supervisory committee will complete an evaluation form, where they evaluate the thesis and the quality of the research conducted by the student, using a scale 1 through 5 (1=unsatisfactory; 3 = satisfactory; 5=excellent) for established criteria such as:

1. The ability to perform research
2. The development of an appropriate solution for the thesis based on fundamentals and advanced topics.

The professor supervising the research-oriented DIS will complete an evaluation form, where he/she will evaluate on a scale of 1 to 5 (1=unsatisfactory; 3 = satisfactory; 5=excellent) the following criteria:

1. The ability to perform research
2. The student has demonstrated an advanced level of knowledge in the selected topic

SLO3: Students possess effective oral and written communication skills

The thesis students will write a thesis and will present orally their research findings to the MS supervisory committee and other people attending the defense.

Implementation Strategy
The evaluation of the written thesis and the oral presentation will be conducted by the MS supervisory committee following the guidelines in the CEECS department. The research-oriented DIS is supervised by a professor working in AI - related areas.

Assessment Method
Each member of the MS supervisory committee will complete an evaluation form, where they evaluate the written thesis and the oral presentation by using a scale of 1 through 5 (1=unsatisfactory; 3 = satisfactory; 5=excellent) for established criteria such as:

:

1. Submission of a satisfactory written thesis.
2. Oral presentation of the thesis in a satisfactory manner.

The professor supervising the DIS will complete an evaluation form at the completion of the DIS, where they evaluate on a scale 1 to 5 (1=unsatisfactory; 3 = satisfactory; 5=excellent) the following criteria:

1. Submission of a satisfactory written report
2. Oral presentation of the DIS report in a satisfactory manner.

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

Admission Requirements
Each applicant to the MSAI program must meet the following requirements:

1. A baccalaureate degree in Computer Science or a related field (Students without a computer science background will be expected to take additional courses);
2. At least a 3.0 (of a 4.0 minimum) GPA in the last 60 credits attempted prior to graduation;
3. Submission of the Graduate Record Examination (GRE) scores. GRE scores more than five years old are normally not acceptable. The GRE requirement is waived for any student who has a baccalaureate degree from FAU's Department of Computer & Electrical Engineering and Computer Science (CEECS) with a GPA of at least 3.25 (out of a possible 4.0) in the last 60 credits attempted prior to graduation; and
4. International students from non-English-speaking countries must be proficient in written and spoken English as evidenced by a score of at least 500 (paper-based test) or 213 (computer-based test) or 79 (Internet-based test) on the Test of English as a Foreign Language (TOEFL) or a score of at least 6.0 on the International English Language Testing System (IELTS).

Applicants are expected to have taken the following prerequisite courses (or equivalents) before pursuing a master's degree. In some cases, prerequisite courses may be taken after admission to the graduate program.

Data Structures and Algorithm Analysis	COP 3530
Design and Analysis of Algorithms	COT 4400
Stochastic Models for Computer Science	STA 4821
Calculus with Analytic Geometry 1	MAC 2311

Calculus with Analytic Geometry 2	MAC 2312

Graduation Requirements
Both thesis and non-thesis options are available and require a minimum of 30 credits. Non-thesis students will take 3 core courses and 7 elective courses from the following AI-related groups: vision, data analytics and algorithms, knowledge management and reasoning, machine learning, and applications. The thesis students will take 3 core courses, 6 thesis credits and 5 elective courses from the areas indicated previously. Both non-thesis and thesis options allow up to 3 elective courses to be substituted with any course in the College of Engineering and Computer Science, with prior approval from the advisor.

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

Both the thesis and non-thesis options of the MSAI program require a minimum of 30 credits in total.

Required Core Courses
The students are required to take 3 required core courses (9 credits):
CAP 5625 Computation Foundation of Artificial Intelligence
CAP 6635 Artificial Intelligence
CAP 6673 Data Mining and Machine Learning

Restricted Electives
Non-thesis students must take at least 7 elective courses (21 credits) from the following AI-related groups: vision, data analytics and algorithms, knowledge management and reasoning, machine learning, and applications. The thesis students will take at least 5 elective courses (15 credits) from the specified AI-related groups.

Unrestricted Electives
Both non-thesis and thesis options allow up to 3 elective courses to be substituted with any course in the College of Engineering and Computer Science, with prior approval from the advisor.

Thesis Requirements
Thesis option requires a minimum of 6 thesis credits.

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

The MSAI program requires a minimum of 30 credits for both thesis and non-thesis options.

Required core courses (9 credits)

Computational Foundations of Artificial Intelligence	CAP 5625
Artificial Intelligence	CAP 6635
Data Mining and Machine Learning	CAP 6673

In addition, students pursuing the non-thesis option are required to take 7 elective courses from the groups: Vision, Data Analytics and Algorithms, Knowledge Management and

Reasoning, Machine Learning, and Applications. Students pursuing the thesis option are required take 5 elective courses from the groups below and 6 thesis credits. Both non-thesis and thesis options allow up to 3 elective courses to be substituted with any course in the College of Engineering and Computer Science, with prior approval from the advisor.

Vision	
Foundations of Vision	CAP 6411
Computer Vision	CAP 6415
Machine Learning for Computer Vision	CAP 6618
Visual Information Retrieval	COP 6728
Data Analytics and Algorithms	
Big Data Analytics with Hadoop	CAP 6780
Social Networks and Big Data Analytics	CAP 6315
Introduction to Data Science	CAP 5768
Data Mining for Bioinformatics	CAP 6771
Analysis of Algorithms	COT 6405
Knowledge Management and Reasoning	
Information Retrieval	CAP 6776
Web Mining	CAP 6777
Natural Language Processing	CAP 6640
Semantic Web Programming	COP 5859
Machine Learning	
Introduction to Neural Networks	CAP 5615
Evolutionary Computing	CAP 6512
Deep Learning	CAP 6619
Advanced Data Mining and Machine Learning	CAP 6778
Sparse Learning	CAP 6617
Applications	
Robotic Applications	EEL 5661
Computational Advertising and Real-time Data Analytics	CAP 6807
Artificial Intelligence in Medicine and Healthcare	CAP 6683

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

Required Core Courses

CAP 5625 Computational Foundations of Artificial Intelligence
This course covers the mathematical and programming foundations of artificial intelligence (AI) and machine learning (ML) using contemporary programming languages and tools. As a result, students will develop familiarity with mathematical methods (and associated

notation, software packages and libraries) that are widely used in AI and ML projects and literature.

CAP 6635 Artificial Intelligence

The basic concepts, techniques, and applications of artificial intelligence: representations, search strategies, control, communication, deduction, agents, evolutionary computation and machine learning.

CAP 6673 Data Mining and Machine Learning

Course deals with the principles of data mining and machine learning. Topics to be covered include machine learning methods, knowledge discovery and representation, classification and prediction models.

Elective courses per group

- **Vision**

CAP6411 Foundations of Vision

Study of the interdisciplinary science of vision combining the psychological, neurophysiological, and computational aspects of vision research. Research paper and project topics will be chosen from a list of latest developments in the field.

CAP6415 Computer Vision

Course covers fundamentals of computer vision and their applications in various areas such as medicine, homeland security, entertainment, and manufacturing.

CAP6618 Machine Learning for Computer Vision

Introduction to machine learning techniques and their application in computer vision problems. Discusses image processing principles, techniques and algorithms. Use of MATLAB for lab assignments and projects.

COP6728 Vision Information Retrieval

Studies the interdisciplinary research area of visual information retrieval. Research paper and project topics are chosen from a list of latest developments and open challenges and opportunities in the field.

- **Data Analytics and Algorithms**

CAP6780 Big Data Analytics with Hadoop

Course covers data mining and machine learning in relation to Big Data. Big Data challenges such as high dimensionality, class imbalance and quality of data are examined. Offers hands-on experience with Big Data analysis in Hadoop using a high performance computing cluster.

CAP6315 Social Networks and Big Data Analytics

This course teaches students basic concepts of Big Data Analytics with focus on social network analysis and modeling. The class covers three major topics: graphs and social network models, Big Data Analytics platform and MapReduce (Hadoop) programming, and social network analytics and mining algorithms.

CAP5768 Introduction to Data Science

This course will survey foundational topics in data science and reinforce practical programming skills in the context of data analytics. Students will learn fundamentals of computational data analysis using statistics and machine learning and gain experience working with data sets from a variety of domains.

CAP6546 Data Mining for Bioinformatics

Course focuses on the principles of data mining as it relates to bioinformatics. Topics covered include gene selection, class imbalance, classification, biomarker discovery and prediction models. No prior knowledge of biology is required.

COT6405 Analysis of Algorithms

Design and analysis of algorithms from several areas of computer science. Topics include advanced data structures, dynamic programming, greedy algorithms, approximation algorithms, and probabilistic algorithms.

- **Knowledge Management and Reasoning**

CAP6776 Information Retrieval
This course teaches concepts, techniques and popular tools and applications in information retrieval (IR), which aims to obtain relevant information from a collection of resources. The class covers efficient text indexing, text processing, web search and text mining. New applications are also introduced.
CAP6777 Web Mining
Course covers the techniques used to model, analyze, and understand the Internet and the web, especially the web graph and hypertext data.
CAP6640 Natural Language Processing
This course will provide students with both theory and applications of Natural Language Processing. It includes relevant background material in Linguistics, Mathematics, Probability, and Computer Science. Some of the topics covered in the class are Text Similarity, Part-of-Speech Tagging, Parsing, Semantics, Question Answering, Sentiment Analysis, and Text Summarization.
COP5859 Semantic Web Programming
Semantic web building blocks (standards, languages and frameworks). Open source tools. Integrated flow with our examples. Build an infrastructure to develop personal and practical Apps. Open to majors in computer science and engineering and others with consent of instructor.

- **Machine Learning**

CAP5615 Introduction to Neural Networks
Brief introduction to biological neural systems. Models of neural mechanisms of learning and memory. Neural net applications to image processing, pattern recognition, machine learning, optimization problems, and robotics. Hardware implementation issues.
CAP6512 Evolutionary Computing
Course provides understanding and exploration of biologically inspired computation. In-depth look at genetic algorithms (variables to be optimized and/or minimized), genetic programming (tree representation and parsing), classifier systems (GA variations and production rules), and evolutionary programming and strategies. Students will have a number of hands-on simulations and design assignments.
CAP6619 Deep Learning
This course teaches students basic concepts of deep learning with applications in computer science, engineering, business and other areas. The class covers major topics including math preliminaries, machine learning basics, deep forward networks, convolution networks, autoencoders, representation learning networks and their implementations and applications.
CAP6778 Advanced Data Mining and Machine Learning
The study of advanced topics in data mining and machine learning. Current research issues in data mining and its application in bioinformatics, computer network security, computer science, and software engineering.
CAP6617 Sparse Learning
This course introduces new concepts, theory, algorithms, and applications of sparse representation and modeling, and their relationship with deep learning. Topics covered include mathematical preliminaries, L1 optimization, pursuit algorithms, sparse representation classifiers, sparse dictionary learning, sparse deep learning, and applications.

- **Applications**

EEL5661 Robotic Applications
Robot classification, robot systems, economic justification; product design for robot assembly; programming, part feeding, tooling.
CAP6807 Computational Advertising and Real-Time Data Analytics
This course teaches students basic concepts of computational advertising with a focus on real-time data analytics for displaying advertisement. The class introduces different key

aspects of building platforms for online advertising, the computational requirement, tools and solutions.

CAP6683 Medical Applications for Artificial Intelligence

This course introduces the underlying concepts, methods, and the potential of intelligent systems in medicine. It explores the application of artificial intelligence (AI) and machine learning methods, techniques, and tools to specific areas in medicine and healthcare. As a research and project-based course, students will have opportunities to identify and specialize in particular AI methods, clinical/healthcare applications, and relevant tools.

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

The aim of the MSAI program to produce AI professionals who will be able to work all sectors of employment, including industry, government and defense. The coursework and research projects to be undertaken by students will help them to meet the needs of a wide range of employers. The Industry Advisory Board of the Department of Computer and Electrical Engineering and Computer Science will meet regularly to ensure that the needs of the employers will be identified and incorporated into the curriculum.

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

At this time, we are not seeking accreditation for the MS in Artificial Intelligence program, since this is not a professional development program.

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

N/A

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

The courses for the MSAI program will be delivered in traditional classroom, distance learning, and online. Most of the courses included in this program are courses already offered by the CEECS department. One new core course (CAP5625 Computational Foundations of Artificial Intelligence) and one elective course (CAP6683 Medical Applications for Artificial Intelligence) have been developed by CEECS to support the development of this program. There is not a perceived need to look outside FAU at this time for shared courses and technologies in regard to the newly proposed MSAI program.

Students enrolled into the MSAI program will be involved in research by pursuing the thesis option, by taking a research-based-DIS course, or through research assistantships. Many of the courses enclosed in this program are of interest to our industry partners. We will work with the department and college Industry Advisory Board to provide opportunities for the students enrolled in the MSAI to gain industry experience.

IX. Faculty Participation

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

Table 4 in Appendix A lists all graduate faculty associated with the program in Years 1 and 5. There is no new faculty hiring needed. The following estimates are used in computing the values in Table 4:

- If a faculty teaches a core course specifically for MSAI (CAP 5625,CAP6635), then the effort is projected to be 33%
- If a faculty teaches a core course which is included in other programs as well (i.e. CAP 6673), then the effort is estimated to be 20%
- If a faculty is the program advisor, then the effort is 15%
- If a faculty is involved in teaching an existing course for the program, thus adding few MSAI students to the class, then the effort is projected to be 6% in the first year. The effort doubles in the fifth year if thesis advising is projected.

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

The proposed budget includes 1 graduate teaching assistant per year in years 1,2, and 3, and 2 graduate assistants per year for years 3 and 4, at the rate (stipend + rate benefits) set by the Graduate College. The graduate teaching assistants positions are reallocated within the CEECS department. Additional details are presented in Table 2 in Appendix A.

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

The abbreviated CVs have been included in the appendices. Brief research interests of the faculty is presented below.

Dr. Taghi M. Khoshgoftaar is Motorola Endowed Chair professor of the Department of Computer and Electrical Engineering and Computer Science, Florida Atlantic University and the Director of NSF Big Data Training and Research Laboratory. His research interests are in big data analytics, data mining and machine learning, health informatics and bioinformatics, social network mining, fraud detection, and software engineering. He has published more than 700 refereed journal and conference papers in these areas. He is the

conference chair of the IEEE International Conference on Machine Learning and Applications (ICMLA 2019). He is the Co-Editor-in Chief of the journal of Big Data. He has served on organizing and technical program committees of various international conferences, symposia, and workshops.

Dr. Xingquan (Hill) Zhu is a professor in the Department of Computer and Electrical Engineering and Computer Science at FAU. Dr. Zhu's research interests are data mining, machine learning, multimedia systems, and bioinformatics.

Dr. Hanqi Zhuang is Associate Chair and a professor in the CEECS department. Dr. Zhuang's research interests span signal and image processing, robotics and computer vision, dictionary learning and deep learning, and their applications.

Dr. Oge Marques is a professor in the CEECS department with research interests in intelligent processing of visual information, a combination of artificial intelligence, image processing, computer vision, human vision, and machine learning, with recent emphasis on medical applications. In addition to applying artificial intelligence to image analysis and computer vision problems, Dr. Marques' research has been inspired by the human factors associated with visual perception, object recognition, image retrieval, and other intelligent visual processing tasks. He has also devoted a significant amount of effort researching the cognitive foundations of human visual perception and building serious games and other human computation solutions (e.g., crowdsourcing) to engage users in such tasks.

Dr. Dingding Wang's primary research interest lies in data mining, information retrieval, and machine learning for improving document understanding. In particular, her research goal is to help users to better understand and utilize large real document data sets via document clustering, summarization, and storyline generation. She also works on research topics related to social network analytics, bioinformatics, music information retrieval, recommendation systems, and malware detection.

Dr. Yufei Tang is an Assistant Professor in the Department of CEECS and a Faculty Fellow of I-SENSE at Florida Atlantic University (FAU), where he is also the Director of the Intelligent and Resilient Systems (IRS) Research Group. His research interests are in the areas of Computational Intelligence (e.g., Machine Learning, Networked Big Data Mining) and Cyber-Physical Systems (e.g., Ocean Energy Systems, Smart Grid). Currently, his research foci are networked big data and system analytics (e.g., social networks and sensor networks), and predictive maintenance of marine structures/systems (e.g., marine hydrokinetic turbine monitoring, harmful algal blooms prediction).

Dr. Feng-Hao Liu is an Assistant Professor in the CEECS department with research interests in cryptography (foundations and applications), and broadly theoretical computer science. Specific topics include: how to compute on encrypted data, how to verify computation in outsourced environments, how to protect memory and computation from physical attacks, and various settings of multiparty computation.

Dr. Kwang-Soo Yang is an Assistant Professor in the CEECS department with research interests in the broadly area of Spatial Big Data (SBD). Examples of SBD include temporally detailed road maps that provide speeds every minute for every road-segment, GPS trace data from cell-phones, and engine measurements of fuel consumption, greenhouse gas emissions, etc. SBD has the potential to transform society via next-generation routing services, emergency and disaster response, and discovery of potentially useful patterns embedded in these datasets. However, SBD poses significant challenges as the size, variety, and update rate of mobile datasets exceed the capacity of commonly used spatial computing and spatial database technologies to learn, manage, and process the data with reasonable effort. My research has focused on two issues within Spatial Big Data: storage of big spatio-temporal network (STN) data and design of scalable algorithms for big spatial networks.

Dr. Dimitris Pados is a Professor in the CEECS department, ISENSE Fellow, and director of the ExtremeComms Laboratory. His research interests are in Communications Theory and Systems (Cognitive Software-defined Radios and Networks; Interference Avoiding Networking; Secure Wireless Communications; Underwater Cognitive Hi-rate/Long-distance Acoustic Communications; Autonomous/Unmanned Aerial/Ground/Underwater System Communications) and Machine Learning and Adaptive Signal Processing (L1-norm

Principal-component Analysis (L1-PCA); Robust Feature Extraction from Faulty Data Sets; Digital Data Embedding/Hiding; Compressed-sensed (Multi-view) Imaging and Video; Localization in GPS-less Environments; Ad-hoc/Dynamic Geometry Beamforming and Array Radar; Communications-Radar Coexistence).

Dr. Elias Bou-Harb is an Assistant Professor in the CEECS department. Dr. Bou-Harb is an expert in cyber threat intelligence, real-time traffic analysis and correlation, and digital/network forensics. Throughout his academic and technical career, Dr. Bou-Harb has gained the ability to represent information in various methods, the aptitude to design and conduct an observational, testing and an application experiment, and the capability to effectively communicate scientific ideas and results. Moreover, he has gained operational engineering capabilities in cyber security R&D, realtime big data analytics, cyber-attack detection and mitigation, efficient malware fingerprinting and real-time traffic analysis.

Dr. Behnaz Ghoraani is an Assistant Professor in the CEECS department and ISENSE. Dr. Ghoraani research interests span biosensor and biomedical signal analysis, non-stationary data analytics, feature extraction and classification, time-frequency signal analysis, pattern classification and recognition, dictionary learning, computer-aided clinical decision making.

Dr. Ravi Shankar is a Professor in the CEECS department. Dr. Shankar's research interests span systems and all issues pertinent so systems.Over the years, he has built up background and expertise, always with a systems perspective, in biomedical engineering, analog and mixed signal design, VLSI and chip design, engineering design automation, concurrent and distributed processing, engineering management, engineering design productivity, software automation, cyberlearning, complex systems, and App development for smart phones, robotics, and the semantic web.

Dr. Mihaela Cardei is a Professor in CEECS department and Associate Dean for Graduate Studies. Dr. Cardei's research interests are in the areas of design of efficient protocols and algorithms for managing communication and energy resources in ad hoc wireless networks:wireless communications and energy efficiency in wireless networks QoS; routing and data dissemination schemes in wireless networks; power-aware scalable topology control in wireless networks; and optimization problems in wireless networking.

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

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

	2013-14	2014-15	2015-16	2016-17	2017-18
Bachelor's	190	171	226	225	232
Master's	71	59	41	54	85
PhD	10	16	5	7	14

Total	**271**	**246**	**272**	**286**	**331**

Total Departmental Research Expenditure

FY2012-13	FY2013-14	FY2014-15	FY2015-16	FY2016-17	FY2017-18
1,021,174	867,727	850,795	1,457,057	2,370,294	2,463,447

The CEECS Department is home to two NSF IUCRC (Industry – University Cooperative Research Centers), two named laboratories (Bidtellect and Tecore). In AY 2017-18, CEECS faculty have published 9 books, 220 peer reviewed publications, 142 conference presentations and submitted 56 grant proposals.

X. Non-Faculty Resources

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

LIBRARY

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

No additional library resources are needed to implement and support the program.

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

The existing space is sufficient for both teaching and research activities associated with the proposed program MSAI. More specifically, the following facility and research labs are available.

Artificial Intelligence and Deep Learning (AIDL) Training and Research Laboratory in Florida (Director: Dr. Hill Zhu)
Hosted at the university, FAU's AIDL laboratory will be shared across multiple campuses and research disciplines and will significantly advance FAU's role in artificial intelligence and deep learning-based intelligent information analysis. FAU's AIDL laboratory infrastructure features a graphics processing unit (GPU) cluster – a computer cluster that enables the performance of very fast calculations – and includes 18 GPU servers and 72 Nvidia Tesla V-100 GPU cards and a 38.4 Terabyte flash memory server. The GPU cards are among the world's best technology for artificial intelligence and deep learning. This project will nearly quadruple the number of GPU cards at FAU from 31 to 103 cards and will increase the onboard GPU memory six times from 381GB to 2,304 GB.

The platform will be shared across FAU's campuses, resulting in a centralized cross-campus interdisciplinary platform and augmented deep learning and related artificial intelligence tools for interdisciplinary research. The AIDL laboratory also will serve as the training and research platform to support graduate student teaching and research activities across multiple campuses, colleges, and disciplines as well as FAU's research pillars.

Big Data Training and Research Laboratory (Director: Dr. Taghi Koshgoftaar)
NSF Big Data Training and Research Laboratory project consisted of procurement and deployment of a large computing cluster appropriate for Big Data research and led to the developed large-scale computational resources capable of solving Big Data challenges at Florida Atlantic University (FAU). The tools and resources provided by this project include a high performance computer cluster and advanced databases and facilities to store, maintain, and secure large quantities of data.

The computational facilities constructed as a part of this project provide student and faculty researchers with access to state-of-the-art hardware and software required to work with Big Data. Researchers have access to multiple distributed file systems including Hadoop and Lustre, and can leverage GPU accelerated nodes for training deep artificial neural networks and for use in other highly parallel tasks. Since the facility's inception, its resources have been used in over 100 published peer reviewed journal and conference papers and continue to be used in many ongoing research projects in a number of Big Data and/or Deep Learning application domains, including anomaly detection, fraud detection, sports medicine, network security, transfer learning, facial recognition, social media mining, fake review detection, and text mining. six PhD and three Masters Students have utilized these facilities to complete their dissertation or thesis and graduate since 2015, with many more set to graduate in the near future.

Additionally, the resources and tools acquired through this project have led to the development of new educational courses for graduate students and advanced undergraduates specifically focused on the tools and techniques necessary for Big Data research, such as using the Hadoop distributed file system for machine learning, and Deep learning.

Bidtellect Laboratory (Director: Dr. Hill Zhu)
The Bidtellect Laboratory is an incubator to support big data analytics and digital advertising research, as well as serve as an educational platform. Bidtellect's proprietary state of the art technology allows native ad planning, buying, selling and overall management on a single platform. By utilizing Bidtellect's Native DSP (nDSP), Native SSP (nSSP) and openRTB 2.3 Native Exchange, advertisers and publishers can now implement effective Native campaigns at scale with maximum optimization.

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

N/A

E. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 in Appendix A includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the

program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

N/A

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

The Department of Computer and Electrical Engineering and Computer Science, which will host the MSAI program, has a comprehensive list of equipment. In addition, the CEECS Department received two major research equipment grants recently, one for big data and another for deep learning, from National Science Foundation, to purchase new equipment, which will be available for the faculty and students in the program. There are no new requests for additional equipment and all the courses that exist or have been developed have considered the impact of additional students.

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

No additional specialized equipment is needed, as the program is modeled on existing master's degree programs in the CEECS Department.

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

The College of Engineering and Computer Science, in particular the CEECS Department will use available resources, including facilities and services, to ensure the success of the MSAI program. There are no additional requests for this new program.

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

Students in this program will be eligible to receive research and teaching assistantships provided that they satisfy the departmental criteria. Due to the fact that many of the students will possess knowledge and skills in AI and machine learning, which will give them advantages in completing departmental scholarships. In fact, many of our faculty have research funding but cannot find qualified students. The MSAI program will help our faculty in their research in a very constructive way. No additional funds are requested.

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

Currently we have internship with NCCI, JM Family, Citrix, Goldman Sachs, American Express, Nexis and Lexis, Oak Ridge National Lab, Florida Power and Light, and Motorola, among others. The departments plan to seek addition sites via joint collaboration to attract local industry partners.

APPENDIX A

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

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Upper-level students who are transferring from other majors within the university**	0	0	0	0	0	0	0	0	0	0
Students who initially entered the university as FTIC students and who are progressing from the lower to the upper level***	0	0	0	0	0	0	0	0	0	0
Florida College System transfers to the upper level***	0	0	0	0	0	0	0	0	0	0
Transfers to the upper level from other Florida colleges and universities***	0	0	0	0	0	0	0	0	0	0
Transfers from out of state colleges and universities***	0	0	0	0	0	0	0	0	0	0
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

* List projected annual headcount of students enrolled in the degree program. List projected yearly cumulative ENROLLMENTS instead of admissions.
** If numbers appear in this category, they should go DOWN in later years.
*** Do not include individuals counted in any PRIOR CATEGORY in a given COLUMN.

APPENDIX A

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(Graduate Degree Program)

Source of Students (Non-duplicated headcount in any given year)*	Year 1		Year 2		Year 3		Year 4		Year 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/industries in your service area (e.g., older returning students)	5	4	5	4	6	5	6	5	7	5
Students who transfer from other graduate programs within the university**	3	2	2	2	0	0	0	0	0	0
Individuals who have recently graduated from preceding degree programs at this university	6	5	8	6	10	8	12	9	14	11
Individuals who graduated from preceding degree programs at other Florida public universities	3	2	5	4	6	5	6	5	7	5
Individuals who graduated from preceding degree programs at non-public Florida institutions	2	2	2	2	3	2	3	2	4	3
Additional in-state residents***	1	1	1	1	2	2	3	2	3	2
Additional out-of-state residents***	0	0	1	1	1	1	2	2	3	2
Additional foreign residents***	0	0	1	1	2	2	3	2	2	2
Other (Explain)***	0	0	0	0	0	0	0	0	0	0
Totals	**20**	**16**	**25**	**21**	**30**	**25**	**35**	**27**	**40**	**30**

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

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

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

APPENDIX A

TABLE 2
PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1 Funding Source								Year 5 Funding Source						
	Reallocated Base* (E&G)	Enrollment Growth (E&G)	New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 1+…+7**	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Philanthropy Endowments	Enterprise Auxiliary Funds	**Subtotal coulumns 9+…+ 14**
Columns	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Faculty Salaries and Benefits	224,045	0	0	0	0	0	0	**$224,045**	326,387	0	0	0	0	0	**$326,387**
A & P Salaries and Benefits	4,404	0	0	0	0	0	0	**$4,404**	4,404	0	0	0	0	0	**$4,404**
USPS Salaries and Benefits	9,695	0	0	0	0	0	0	**$9,695**	16,159	0	0	0	0	0	**$16,159**
Other Personal Services	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Assistantships & Fellowships	18,000	0	0	0	0	0	0	**$18,000**	36,000	0	0	0	0	0	**$36,000**
Library	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Expenses	5,000	0	0	0	0	0	0	**$5,000**	12,000	0	0	0	0	0	**$12,000**
Operating Capital Outlay	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Special Categories	0	0	0	0	0	0	0	**$0**	0	0	0	0	0	0	**$0**
Total Costs	**$261,144**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$261,144**	**$394,950**	**$0**	**$0**	**$0**	**$0**	**$0**	**$394,950**

*Identify reallocation sources in Table 3.

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

***Identify if non-recurring.

Faculty and Staff Summary

Total Positions	Year 1	Year 5
Faculty (person-years)	1.03	1.43
A & P (FTE)	0.05	0.05
USPS (FTE)	0.15	0.25

Calculated Cost per Student FTE

	Year 1	Year 5
Total E&G Funding	$261,144	$394,950
Annual Student FTE	16	30
E&G Cost per FTE	$16,322	$13,165

Table 2 Column Explanations

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

APPENDIX A

TABLE 3
ANTICIPATED REALLOCATION OF EDUCATION & GENERAL FUNDS*

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
Computer Engineering	5,794,976	261,144	**$5,533,832**
Totals	$5,794,976	$261,144	**$5,533,832**

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

APPENDIX A

TABLE 4
ANTICIPATED FACULTY PARTICIPATION

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Oge Marques, Ph.D. CEECS	Professor	Tenure	Fall 2019	9	0.75	0.33	0.25	9	0.75	0.33	0.25
A	Taghi Khoshgoftaar, Ph.D. CEECS	Professor	Tenure	Fall 2019	9	0.75	0.35	0.26	9	0.75	0.35	0.26
A	Dingding Wang, PhD CEECS	Asst. Prof.	Tenure	Fall 2019	9	0.75	0.06	0.05	9	0.75	0.12	0.09
A	Hanqi Zhuang, PhD CEECS	Professor	Tenure	Fall 2019	9	0.75	0.06	0.05	9	0.75	0.12	0.09
A	Xingquan (Hill) Zhu, PhD CEECS	Professor	Tenure	Fall 2019	9	0.75	0.33	0.25	9	0.75	0.33	0.25
A	Mihaela Cardei, PhD CEECS	Professor	Tenure	Spring 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05
A	Yufei Tang, PhD CEECS & ISENSE	Asst. Prof.	Tenure	Fall 2019	9	0.75	0.06	0.05	9	0.75	0.12	0.09
A	Feng-Hao Liu, PhD CEECS	Asst. Prof.	Tenure	Fall 2021	9	0.75	0.00	0.00	9	0.75	0.06	0.05
A	Ravi Shankar, PhD CEECS	Professor	Tenure	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.06	0.05
A	Kwang-Soo Yang, PhD CEECS	Asst. Prof.	Tenure	Fall 2021	9	0.75	0.00	0.00	9	0.75	0.06	0.05
A	Dimitris Pados, PhD CEECS & ISENSE	Professor	Tenure	Fall 2020	9	0.75	0.06	0.05	9	0.75	0.12	0.09
A	Elias Bou-Harb, PhD CEECS	Asst. Prof.	Tenure	Spring 2022	9	0.75	0.00	0.00	9	0.75	0.12	0.09
A	Behnaz Ghoraani, PhD CEECS & ISENSE	Asst. Prof	Tenure	Fall 2022	9	0.75	0.00	0.00	9	0.75	0.06	0.05
	Total Person-Years (PY)							**1.03**				**1.43**

Current Salary	Salary (Year 1)	S&B (Year 1)	PY (Year 1)	Salary (Year 5)	S&B (Year 5)	PY (Year 5)
128,594.89	131,166.79	167,893.49	55,405.00	141,979.15	181,733.31	59,972.00
132,580.79	135,232.41	173,097.48	60,584.00	146,379.91	187,366.28	65,578.00
93,894.47	95,772.36	122,588.62	7,355.00	103,667.08	132,693.86	15,923.00
128,765.93	131,341.25	168,116.80	10,087.00	142,167.99	181,975.03	21,837.00
113,468.61	115,737.98	148,144.62	48,888.00	125,278.51	160,356.50	52,918.00
128,052.64	130,613.69	167,185.53	10,031.00	141,380.46	180,966.99	10,858.00
94,023.62	95,904.09	122,757.24	7,365.00	103,809.67	132,876.38	15,945.00
91,918.23	93,756.59	120,008.44	-	101,485.15	129,901.00	7,794.00
121,887.37	124,325.12	159,136.15	9,548.00	134,573.51	172,254.09	10,335.00
91,918.23	93,756.59	120,008.44	-	101,485.15	129,901.00	7,794.00
188,700.00	192,474.00	246,366.72	14,782.00	208,340.05	266,675.26	32,001.00
90,292.95	92,098.81	117,886.48	-	99,690.71	127,604.11	15,312.00
119,352.75	121,739.81	155,826.95	-	131,775.08	168,672.10	10,120.00
			224,045.00			326,387.00

Faculty Code		Source of Funding	PY Workload by Budget Classsification Year 1		Year 5
A	Existing faculty on a regular line	Current Education & General Revenue	1.03		1.43
B	New faculty to be hired on a vacant line	Current Education & General Revenue	0.00		0.00
C	New faculty to be hired on a new line	New Education & General Revenue	0.00		0.00
D	Existing faculty hired on contracts/grants	Contracts/Grants	0.00		0.00
E	New faculty to be hired on contracts/grants	Contracts/Grants	0.00		0.00
		Overall Totals for	**Year 1** 1.03	**Year 5**	1.43