BOARD OF GOVERNORS
STATE UNIVERSITY SYSTEM OF FLORIDA
NEW DOCTORAL DEGREE PROPOSAL STAFF ANALYSIS

Program: Ph.D. in Big Data Analytics
CIP Code: 27.0501
Institution: University of Central Florida
Proposed Implementation Date: Fall 2018
Staffed By: Diana Barbu, PhD
Initial Review Date: 4/5/17 **Last Update:** 5/5/17

Projected program costs:

	Total	% & $ Current Reallocated	% & $ New Recurring	% & $ New Non-Recurring	% & $ C&G	Auxiliary Funds	Cost per FTE	2015-16 SUS Average Cost per FTE
Year 1	$267,210	100% $267,210	0% $0	0% $0	0% $0	$0	$62,873	$12,130* 27 CIP
Year 5	$660,495	93% $614,121	0% $0	0% $0	7% $46,374	$0	$42,613	

* NOTE: The range of costs associated with the Average E&G Cost per FTE can vary considerably by university due to factors related to enrollment scale and diversity of programs in any particular CIP Code.

Projected FTE and Headcount are:

	Student Headcount	Student FTE
First Year	6	4.25
Second Year	13	9.25
Third Year	19	12
Fourth Year	24	15.5
Fifth Year	24	15.5

On March 29, 2007, the Florida Board of Governors approved Board Regulation 8.011, which sets forth criteria for implementation and authorization of new doctorates by the Board of Governors, as well as criteria for implementation and authorization of Bachelor's, Master's and Specialist degrees by Boards of Trustees. The following staff analysis is an assessment of how well the university meets Board Accountability and Readiness criteria for implementation of this degree program.

Proposal Page Numbers:

INTRODUCTION		ACCOUNTABILITY		READINESS				
Program Description	**BOG Goals**	**Overall**	**Budget**	**Mission and Strength**	**Program Quality**	**Curriculum**	**Faculty**	**Resources**
2	6	8	37	46	51	53	69	78

A. Program Description:

The University of Central Florida (UCF) is proposing to offer a Doctor of Philosophy in Big Data Analytics at its main campus in Orlando.

The proposed program "will have a strong emphasis in statistical computing … with potential concentrations in bioinformatics, banking, healthcare, education, manufacturing," and other data intensive disciplines (p. 3). Big Data Analytics entails the analysis of very large quantities of data that may include billions or trillions of records, from areas such as banking financial transactions, retail sales, social media records, etc. (n. p.).

The proposed program would be the first PhD in Big Data Analytics to be offered in the state of Florida, but would share the CIP code with two existing PhD in Statistics programs (CIP 27.0501), offered by UF and FSU. The program will "train researchers with a statistics background to analyze massive, structured or unstructured data to uncover hidden patterns, interesting, actionable associations and other useful information" to enhance decision making (p. 4). The proposal notes that 90% of the graduates would likely pursue industry and government positions, due to potential for high salaries, and 10% would likely pursue academic positions (p. 2, 17, 43).

The proposed doctoral program will require the completion of 72 credit hours beyond a bachelor's degree. Students will have the possibility to transfer up to 30 credits hours from a completed master's degree into the program. The 72 credit hours include 42 credits of required courses, 15 credits of electives, and a minimum of 15 credits of dissertation (p. 3).

B. System-Level Analysis and Evaluation in accordance with BOG Regulation 8.011:

The proposal notes that the program will support several goals included in the BOG 2012-2025 Strategic Plan:

- *Strengthen Quality & Reputation of Scholarship, Research, and Innovation* – by facilitating pioneering scholarship and impactful research in data analytics;
- *Increase Research and Commercialization Activity* – by producing graduates that devise innovative solutions for current problems;
- *Increase Levels of Community and Business Engagement* – by involving industry partners and members of the Big Data Analytics Advising Board in the development of the program's curriculum and providing students with paid internship opportunities;
- *Increase the Number of Degrees Awarded in STEM* – the program will be affiliated with a STEM CIP code (27.0501);

- *Increase Collaboration and External Support for Research Activity* – by providing students with stipends so that they can focus on research and teaching.

Need for Graduates in the Labor Market

The proposal provides a comprehensive analysis for the need in the labor market for graduates from this program. The following section provides an overview of the reports and sources cited in the proposal and reviewed by BOG staff documenting the demand in the labor market for PhD in Big Data Analytics graduates.

The proposal includes a report developed by Sara Royster, as economist affiliated with the U.S. Bureau of Labor Statistics (BLS). Royster (2013) noted that workers who work with big data are known as data scientists or data analysts. However, the data scientists/data analysts discipline is affiliated with the statisticians and/or computer programmers' occupations in the Occupational Outlook Handbook maintained by BLS. Additionally, besides the statisticians and computer programmers' occupations other potential occupations for data scientists or data analysts include managers (chief data scientist, chief information officer), software developers, and postsecondary teachers (Royster 2013, p. 4). The report notes that in terms of education and training "in addition to having a bachelor degree, most analysts who work with big data have a master's or higher degree" and that "big data work can require" knowledge of statistics and computer systems as well as knowledge and experience of relevant field (finance, healthcare, etc.) (Royster 2013, p. 9).

The following section provides an analysis for the entry level educational credential typically associated with these occupations as well as an analysis of job posting following searches on large job adverting websites.

Tables 1 and 2 included below indicate the occupations that are affiliated with the CIP code for this program as indicated by BLS as well as the occupations associated with data scientist/analysts as included in the Royster (2013) report. The results included in both tables show that the entry level educational credential required for accessing the occupations included below is set at the baccalaureate or master's level, except for Mathematical Science Teachers, Postsecondary, where the entry level educational credential is set at master's level or higher.

Table 1: Projected increase for occupations associated with CIP 27.0501 by educational level at the national and state level

Occupations (for CIP 27.0501)	**National Projections (BLS)** for the Occupation Between 2014-2024	**Florida Projections (DEO)** for the Occupation Between 2016-2024	**Entry-Level Education (BLS)**
Natural Sciences Managers	3%	11.6%	Bachelor's Degree
Actuaries	18%	17.7%	Bachelor's Degree
Statisticians	34%	41.9%	Master's degree
Survey Researchers	12%	17.7%	Master's degree
Mathematical Science Teachers, Postsecondary	21.7%	19.1%	Doctoral or professional degree

Table 2: Projected increase for occupations associated with data scientists/analysts by the national Bureau of Labor Statistics, as provided in the Royster (2013) report.

Occupations	**National Projections (BLS)** for the Occupation Between 2014-2024	**Florida Projections (DEO)** for the Occupation Between 2016-2024	**Entry-Level Education (BLS)**
Statisticians	34%	41.9%	Master's degree
Computer Programmers	-8%	-2.2%	Bachelor's Degree
Managers (Chief Data Scientists)	Unable to determine		
Managers (Chief Information Officers)	Unable to determine		
Software Developers	17%	20.1%	Bachelor's Degree
Mathematical Science Teachers, Postsecondary	21.7%	19.1%	Doctoral or professional degree

Sources: Bureau of Labor Statistics (BLS) employment projections from 2014 to 2024 as of 4/6/2017. The BLS national average growth rate for all occupations is 7%. Florida Department of Economic Opportunity (DEO) employment projections from 2016 to 2024 as of 4/6/2017. The DEO calculated average growth rate for all occupations in Florida is 10% (staff calculations).

The U.S. Department of Labor, Bureau of Labor Statistics, is currently in the process of revising Standard Occupational Codes (SOCs) used for data collection and analysis. As part of this initiative, starting in 2018 data scientists will likely become a standalone occupation, however the entry level educational credential has not been specified yet.

Table 3 includes an analysis of job openings advertised in Florida as well as at nationwide through major job advertising websites. The table includes industry and academic positions. The table indicates that for data analyst and data scientist positions the educational requirements range between bachelor and PhD level. However, some of the advertisements that require a PhD also require several years of experience, so it is unknown whether recent PhD graduates would meet this criteria. In terms of academic positions, demand for faculty in data analytics/science is strong both in Florida as well as nationwide. It should be noted that the hiring season for academic position just ended and it will open up again in the fall. Therefore, the number of academic positions included in the table below may be higher than what is available at this time.

Table 3: Job Openings

Position Search	Number of Postings in Florida	Number of Postings Nationwide	Educational Requirements (Percentage of Positions)
Data Scientist	59 (www.indeed.com)	More than 1,000 (www.monster.com)	No education specified (12%) Bachelor (33%) Master (21%) PhD (33%)
Data Analyst	247 (www.indeed.com)	More than 1,000 (www.monster.com)	No education specified (16%) Bachelor (75%) Master (1%) PhD (0%)
Faculty/Academic	6 (www.insidehighered. com)	4 (www.insidehighered. com)	PhD (100%)
	14 (www.chronicle. com)	116 (www.chronicle. com)	PhD (100%)

Searches conducted on 4/11/2017.

Additionally, the proposal describes several searches for open positions using "big data analytics" as key words. These searches were conducted in 2015 at the national and state level as well as for the Central Florida region. Several websites such as employflorida.com, monster.com, dice.com, jobserve.us, etc., were used for these searches. According to the proposal 354 of the 829 or 43% of the data scientist ads provided by www.indeed.com mentioned a graduate degree (M.S. or Ph.D.) as a requirement for consideration. Among the employment ads posted on www.dice.com, 103 out of the 535 ads or 19% listed a graduate degree as a requirement or preferred credential for the job. Similarly, 37 of the 99 or 37% of the position ads returned by www.careerbuilder.com required a graduate credential and expressed preference for a doctoral level degree. These results point to the increased need for individuals trained in the area of big data/data science/data analytics (see proposal pages 13-23).

The proposal notes that a 2015 Forbes report found that the need for doctoral level trained data scientists/analysts has been high during the last few years and the trend continues to show high demand for Big Data Analytics graduates. For example, the report notes that 26,488 positions that required big data expertise were advertised by IBM, Cisco, and Oracle during 2015. Additionally, the report shows that the advertised salaries for these positions range from $80,000 - $200,000. However, the report does not specify the educational requirements for these jobs.

Finally, the proposal includes 13 letters of support from industry partners with operations in Central Florida, Florida, and nationwide, such as Disney, City Group, Johnson & Johnson, SAS, iCube, Health First, Florida Blue, and others. The letters emphasize partners' need for graduates from PhD Big Data Analytics programs and commitment to continuing to provide internship opportunities for students in this and similar programs. One letter indicates the partner's readiness to offer two paid internships to PhD students in this program as well as cloud computing resources for the program (Appendix F).

In conclusion, data analytics/data science is a rapidly expanding new discipline. Consequently, the U.S. Bureau of Labor Statistics agency will assign it a specific occupational code in 2018. In terms of labor demand for graduates, tables 1 and 2 show that occupations related to data analytics/data science, such as statisticians, are projected to grow during the next seven years much faster than the average. Even though the entry level educational requirements listed in tables 1 and 2 are set at the bachelor level, information included in table 3 as well as the results discussed above show that there is a demand for doctoral level graduates in data science in the labor market in both industrial and academic settings. Therefore, the graduates of the proposed program are expected to have little to no difficulty securing financially rewarding employment upon graduation.

Demand from Students

The enrollments goals for the proposed PhD in Big Data Analytics are 6 and 24 students for years 1 and 5, respectively. The following section provides an analysis of student demand for and potential supply to the program.

The proposal notes that to gauge student interest in the PhD program the university administered a survey to students enrolled in a Data Mining course. The results show that three (3) out of the 25 students' surveyed or 12% would be "interested in applying for a PhD in Data Analytics at UCF" (p. 31). Additionally, the proposal notes that "during the last several years at least 3-4 students per year from the existing master level specialization inquired about training beyond the master's level" (p. 30).

The University of Central Florida (UCF) already offers a Master in Statistics with a track in Data Mining and a Master in Data Analytics. The university has also offered a Data Mining track under the Master in Statistics since 2001. However, UCF set up their Master in Data Analytics starting with Fall 2016 and 15 students enrolled during the first term. Additionally, New College of Florida launched their Master in Data Science and 14 students enrolled during the first term (Fall 2016).

Additionally, several SUS institutions are offering bachelor and master level programs in Statistics that could serve as feeders for the proposed program (table 4). However, it should be noted that bachelor and master graduates from any major (health, business, computer science, etc.) who meet the admission requirements could receive consideration for admission into the proposed PhD in Big Data Analytics.

In conclusion, considering that the program allows for students to apply for the program with a bachelor or master's diploma, the fact that there is no restriction on the type of major students need to graduate from to be able to apply for this program, the demand for Data Analytics/Data Science graduates in the labor market, as well as the fact that many SUS institutions have programs that could serve as a feeder to the current program, the university should have no difficulty meeting its enrollment goals, in the short- and long-term.

External Consultants' Reports

Two external consultants were invited to review the proposed program. Both consultants expressed support for the program and explained that UCF is uniquely positioned to offer the program. The following section includes brief comments from each report.

Dr. Ramon C. Littell, Professor Emeritus of Statistics at the University of Florida was the first consultant to review the proposal. Dr. Littell noted that UCF's department of statistics is young and hence more likely to invest resources into a new program. He noted that UCF "has potential for reaching higher and higher academic recognition and visibility in business and industry because of the vibrant environment in Orlando and the will of the faculty to accept new challenges" (Appendix E).

Dr. Min Yang, Professor of Statistics in the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, was the second consultant to review the proposal. Dr. Yang noted that data analysts must master four core skills: statistics inference, algorithms, data management, and network computation. Dr. Yang noted that the proposed program offers comprehensive training in all of these areas.

It should be noted that most doctoral proposals include only one external consultant.

The proposed program was reviewed by two consultants and both of them expressed support for its implementation.

Summary

The proposed PhD in Big Data Analytics would provide several benefits to the community, state, and nation. First, it would be the first standalone program in the state. Second, the proposal illustrates in great detail and BOG staff research confirms that demand for PhD in Big Data Analytics graduates exists in the labor market in both industrial and academic settings. Therefore, this program would fill these gaps by providing experts to contribute to the advancement of the field. Third, the financial rewards associated with Data Analytics/Data Scientists positions are significant (range between $80,000 - $200,000 and potential bonuses).

The only concern would be the fact that UCF is already offering a track in Data Mining under the Master in Statistics and a Master in Data Analytics as a standalone program. Therefore, the proposed program may compete for enrollments with their existing program and track. Plus, given the high salaries available for graduates of Master in Data Analytics in the labor market it may be difficult to convince graduates from the Master in Data Analytics or Statistics to continue their education and enroll in a PhD program. However, both of these concerns are mitigated by the fact that bachelor's diploma holders and master's diploma holders would receive equal consideration for admission into this program, provided that the admission requirements are met. Plus, the minimum number of credit hours required for the completion of the PhD program beyond a master's degree would be 42, which can make the program attractive to graduates from various masters' programs.

Additionally, given the existing partnerships of the university with the industry located in Florida, nationwide, as well as internationally (Sanofi) students in the program could benefit from the experience and exposure gained through the internship opportunities provided by these partnerships.

All in all, the program would be a great fit for the university, state, industrial and academic partners, as well as the community as a whole. Additionally, the program is expected to have no difficulty meeting its enrollment goals in the short- and long-term.

C. Assessment of the University Review Process in accordance with BOG Regulation 8.011:

Due to the system of stair step accountability set in place by the Board of Governors in Regulation 8.011, it is now incumbent upon University Board of Trustees to verify that all doctoral programs coming before the Board of

Governors have met the requirements of the regulation. The following is an assessment of the university review process to ensure that all criteria set forth have been considered by the university prior to submission to the Board of Governors office.

ACCOUNTABILITY

Check 'yes' or 'no' box, and make comments beneath criterion as appropriate.

1. *Overall –* *The proposal is in the correct format, includes all necessary signatures, and contains complete and accurate tables for enrollment projections, faculty effort, and the proposed budget.*

YES NO

☒ ☐ **The proposal has been approved by the university board of trustees and includes all required signatures.**

The University of Central Florida Board of Trustees approved the program on March 16, 2017.

☒ ☐ **The university has provided a proposal written in the standard SUS format which addresses new academic program approval criteria outlined in BOG Regulation 8.011.**

The Board of Governors new degree proposal format is used, as expressed in the Board's Regulation 8.011.

☒ ☐ **The pre-proposal was reviewed by the Council of Academic Vice Presidents (CAVP) workgroup and any concerns identified by the group have been listed and addressed in the proposal.**

The pre-proposal was presented to the CAVP group in January 24, 2014 and no formal concerns were noted.

☒ ☐ **The university has provided data that supports the need for an additional program in the State University System as well as letters of support or concern from the provosts of other state universities with substantially similar programs.**

No other university in the state offers a PhD in Big Data Analytics. However, the proposed program would share the same CIP code with Statistics programs (27.0501). There are two PhD in Statistics programs offered in the SUS, one at UF and one at FSU. The curriculum for the proposed program was compared with the curricula of the existing programs. The comparison shows that UCF's proposed curriculum overlaps with UF and FSU's curricula in proportion of 28.5% and 21.4%, respectively (p. 32-34).

Additionally, the chairs of the Statistics Department at each university were contacted and asked to review the curriculum for the proposed program. One department head (FSU) expressed strong support for the program and another one (UF) expressed no concerns for the proposed curriculum and program (Appendix H).

☒ ☐ **The university has provided complete and accurate projected enrollment, faculty effort, and budget tables that are in alignment with each other.**

The university provided adequate information on enrollment (Table 1-B), budget (Table 2), and faculty effort (Table 4).

☒ ☐ **The university has included a statement in the proposal signed by the equity officer as to how this proposal will meet the goals of the university's equity accountability plan.**

The program plan for achieving diversity has been reviewed and signed by the UCF Equal Opportunity Officer on 9/2/2016.

☒ ☐ **The program does not substantially duplicate programs at FAMU or FIU or, if it does, evidence was provided that consultations have occurred with the affected university on the impact of the new program on existing programs.**

The proposed program does not duplicate any program offerings at FAMU or FIU.

2. Budget – *The proposal presents a complete and realistic budget for the program consistent with university and BOG policy, and shows that any redirection of funding will not have an unjustified negative impact on other needed programs.*

YES NO

☒ ☐ **The University Board of Trustees has approved the most recent budget for this proposal.**

The University of Central Florida Board of Trustees approved the program on March 16, 2017.

☒ ☐ **The university has reviewed the budget for the program to ensure that it is complete and reasonable, and the budget appears in alignment with expenditures by similar programs at other SUS institutions.**

The average SUS expenditure per student FTE at the doctoral level CIP 27 for academic year 2015-2016 is $12,130. The University of Central Florida proposal shows that the cost per student FTE for years one and five will be $62,873 and $42,613, respectively.

☐ ☒ **The proposal indicates that the program will follow the cost-recovery or market-rate funding models. If so, details and timelines for getting approvals for these funding models are included in the proposal.**

The proposal will follow the traditional E&G funding model.

☒ ☐ **In the event that resources within the institution are redirected to support the new program, the university has identified this redirection and determined that it will not have a negative impact on undergraduate education, or the university has provided a reasonable explanation for any impact of this redirection.**

READINESS

Check 'yes' or 'no' box, and make comments beneath criterion as appropriate.

3. Program Quality *– The proposal provides evidence that the university planning activities have been sufficient and responses to any recommendations to program reviews or accreditation activities in the discipline pertinent to the proposed program have been addressed.*

YES NO

☒ ☐ **The university has followed a collaborative planning process for the proposed program in accordance with policies and procedures adopted by the University Board of Trustees.**

☒ ☐ **An external consultant has reviewed the proposal and supports the department's capability of successfully implementing this new program.**

Two external consultants reviewed the proposed program. Both consultants expressed support for the program and explained that UCF is uniquely to offer the program. The following sections include brief comments from each report.

Dr. Ramon C. Littell, Professor Emeritus of Statistics at the University of Florida was the first consultant to review the proposal. Dr. Littell noted that UCF's department of statistics is young and that it is more likely to invest resources into a new program. He noted that the existing and proposed courses clearly define a well-planned program of study. Additionally, UCF's Department of Statistics

includes strong faculty with backgrounds in engineering, computing, and statistics, that ensure that the program will be successful. In closing, the report notes that "UCF … has potential for reaching higher and higher academic recognition and visibility in business and industry because of the vibrant environment in Orlando and the will of the faculty to accept new challenges" (Appendix E). While Dr. Littell has not directly expressed support for the implementation of the proposed program, the laudatory language provided throughout the report provides strong indirect support for the implementation of the program.

Dr. Min Yang, Professor of Statistics in the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, was the second consultant to review the proposal. Dr. Yang noted that data analysts must master four core skills: statistics inference, algorithms, data management, and network computation. Dr. Yang noted that the proposed program offers comprehensive training in all of these areas. In closing, the consultant noted that "the program will be very successful" and provided "the highest recommendation" for the implementation of the program.

It should be noted that most doctoral proposals are reviewed by only one external consultant. The proposed program was reviewed by two consultants and both of them expressed support for its implementation.

☒ ☐ **The university has found the level of progress that the department has made in implementing the recommendations from program reviews or accreditation activities in the discipline pertinent to the proposed program to be satisfactory.**

The proposal notes that the Bachelor and Master programs offered by the Department of Statistics were reviewed in 2010. Recommendation from this review are included in the proposal together with the progress status of the department. Some of the recommendations provided as part of the program review in 2010 include: collaborate with other units to identify interdisciplinary strategies, encourage student interdisciplinary research, identify student workspace, seek opportunities for funded research, develop a professional science master, etc.. A progress status has been provided in the proposal for each of these recommendations (p. 51-53).

☒ ☐ **The university has analyzed the feasibility of providing all or a portion of the proposed program through distance learning.**

The university examined the feasibility of providing the program in collaboration with other institutions. However, due to the fact that the program

will be offered on the main campus in a face-to-face format, data security and storage requirements, and the need for constant interaction between faculty advisers and students, a collaboration with other institutions is unfeasible at this time (p. 68).

☐ ☐ **If necessary, the university has made allowances for licensure and legislative approval to be obtained in a timely manner.**

This section is not applicable for this program.

4. Curriculum *- The proposal provides evidence that the university has evaluated the proposed curriculum and found that it describes an appropriate and sequenced course of study, and that the university has evaluated the appropriateness of specialized accreditation for the program.*

YES NO

☒ ☐ **The university has reviewed the curriculum and found that the course of study presented is appropriate to meet specific learning outcomes and industry driven competencies discussed in the proposal.**

☒ ☐ **The university anticipates seeking accreditation for the proposed doctoral program, or provides a reasonable explanation as to why accreditation is not being sought.**

There are no agencies or learned societies to accredit Big Data Analytics programs.

5. Faculty *– The proposal provides evidence that the university is prepared to ensure a critical mass of faculty will be available to initiate the program based on estimated enrollments, and that faculty in the aggregate have the necessary experience and research activity to sustain a doctoral program.*

YES NO

☒ ☐ **The university has reviewed the evidence provided and found that there is a critical mass of faculty available to initiate the program based on estimated enrollments.**

According to the proposal six (6) full-time faculty members will be directly involved in the new program in year one and 13 full-time faculty members will be directly involved in the new program by year five.

☒ ☐ **The university has reviewed the evidence provided and found that the faculty in aggregate has the necessary experience and research activity to sustain the program.**

Table 4 shows that all faculty members hold terminal degrees in their fields.

☒ ☐ **The university has reviewed the evidence provided and found the academic unit(s) associated with this new degree to be productive in teaching, research, and service.**

The proposal provides evidence of faculty productivity. During academic year 2015-2016 faculty secured $3.4 million in contracts and grants.

☐ ☒ **If appropriate, the university has committed to hiring additional faculty in later years, based on estimated enrollments.**

The university has the necessary faculty resources to support the program.

6. Resources *– The proposal provides evidence that the university has ensured the available library volumes and serials; classroom, teaching laboratory, research laboratory, office space, equipment, clinical and internship sites, fellowships, scholarships, and graduate assistantships will be sufficient to initiate the program, and that if applicable, funding has been secured to make more resources available as students proceed through the program.*

YES NO

☒ ☐ **The university has provided a signed statement from the Library Director verifying that the library volumes and serials available are sufficient to initiate the program.**

The Library Director attests that the library volumes and serials available are sufficient to implement the program. However, $3,000 per year have been allocated to library expenses for the first five years to ensure that adequate holdings are available to support the program.

☒ ☐ **The university has ensured that the physical space necessary for the proposed program, including classrooms, laboratories and office space, is sufficient to initiate the program.**

According to the proposal, instructional space is sufficient.

☒ ☐ **The university has ensured that necessary equipment is available to initiate the program.**

The university budgeted $30,000 annually to be used for purchasing cloud computing services, storage space for SAS, as well as software and hardware to support the program (p. 81). Additionally, an additionally $30,000 annually has been budgeted to cover "the cost of recruiting trips, especially to FAMU and FIU," to ensure a robust and diverse pool of applicant for the program (p. 81).

☒ ☐ **The university has ensured that fellowships, scholarships, and graduate assistantships are sufficient to initiate the program.**

The proposal notes that program will provide assistantships for four (4) years to the vast majority of the students (p. 36, 39). The proposal notes that five (5) students will be provided stipends ($18,000 per student) for graduate teaching assistantships in year one, for a total of $90,000. By year five 19 students will be provided stipends for a total of $342,000 (p. 39, 81). These funds have been included in the budget table of the proposal and letters of commitment from the UCF's College of Sciences, Department of Statistics, and the College of Graduate Studies were provided in Appendix J.

☒ ☐ **If applicable, the university has ensured that the department has arranged a suitable number of clinical and internship sites.**

The proposal notes that the university has strong relationships with industry partners and will continues to cultivate additional ones. Therefore, students will be provided with opportunities for paid internships. Some of the existing UCF industry partners includes Sodexo, Citi Bank, Sanofi Pasteur, iCube CSI, Health First, etc. (p. 82).