MARYLAND HIGHER EDUCATION COMMMISSION
ACADEMIC PROGRAM PROPOSAL

PROPOSAL FOR:

✓ NEW INSTRUCTIONAL PROGRAM

____ SUBSTANTIAL EXPANSION/MAJOR MODIFICATION

____ COOPERATIVE DEGREE PROGRAM

✓ WITHIN EXISTING RESOURCES or ____ REQUIRING NEW RESOURCES

(For each proposed program, attach a separate cover page. For example, two cover pages would accompany a proposal for a degree program and a certificate program.)

Johns Hopkins University
Institution Submitting Proposal

Fall 2016
Projected Implementation Date

Master of Science	**Geospatial Intelligence**
Award to be Offered	Title of Proposed Program

2207-04	**29.0203**
Suggested HEGIS Code	Suggested CIP Code

Krieger School of Arts and Sciences	**Beverly Wendland, Dean**
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Sunil Kumar R 9/20/2016 President/Chief Executive Approval

N/A
Date — Date Endorsed/Approved by Governing Board

The Johns Hopkins University
Krieger School of Arts and Sciences
Proposal for a New Academic Program

Master of Science in Geospatial Intelligence

A. Centrality to institutional mission statement and planning priorities

1. Program description and alignment with mission

The Johns Hopkins University Krieger School of Arts and Sciences proposes to launch a new online Master of Science in Geospatial Intelligence. The newly proposed program will build upon the existing M.A. in Global Security Studies.

Offered through the Krieger School's Advanced Academic Programs (JHU-AAP), the M.S. in Geospatial Intelligence is designed to provide students with the technical and critical thinking skills, background knowledge, and ethical context necessary to become highly skilled geospatial analysts, prepared to confront numerous challenges in a variety of settings. JHU-AAP intends to seek accreditation by the United States Geospatial Intelligence Foundation (USGIF) for the proposed program. USGIF accreditation provides assurance that the program meets standards to serve the geospatial intelligence community of government and industry partners.

The mission of Johns Hopkins University is to educate its students and cultivate their capacity for life-long learning, to foster independent and original research, and to bring the benefits of discovery to the world. In addition, the mission of JHU-AAP is to offer high quality graduate courses, certificates and degree programs containing a mixture of theory and practice that serve the current and long term needs of today's adult learners. The proposed program is consistent with the Johns Hopkins mission and the State of Maryland's goals for maintaining and strengthening a preeminent statewide array of postsecondary institutions recognized nationally for academic excellence and effectiveness in fulfilling the educational needs of students, the State and the nation; and for promoting economic growth and vitality through the advancement of research and the development of a highly qualified workforce.

2. Alignment with institutional strategic goals

The proposed program in Geospatial Intelligence will advance the mission of the university and JHU-AAP by offering life-long learning for those developing new skills, exploring new careers, or expanding their professional knowledge. Students interested in a career or in work related to geospatial intelligence must be committed to life-long learning, as well as to acquiring cross-disciplinary analytical skills and understanding relevant to the development of the profession.

B. Adequacy of curriculum design and delivery to related learning outcomes

1. Program outline and requirements

The proposed program consists of 11 courses — seven required courses and three electives. (See Appendix A for a complete list of courses and course descriptions.)

Required Courses

430.601 Geographic Information Systems (4)
470.719 Technical Collection of Intelligence (3) *OR*
430.602 Remote Sensing: Earth Observing Systems and Applications (4)
430.603 Geospatial Data Modelling (4)
430.604 Spatial Analysis with GIS (4)
470.748 Art and Practice of Intelligence (3)
430.612 Cartographic Design and Visualization (4)
470.696 Ethics and Privacy in Intelligence Operations (3)

Three Elective Courses

406.677 Social Science and National Security and Intelligence (3)
430.600 Web Mapping (4)
430.606 Programming in GIS (4)
430.607 Spatial Databases and Data Interoperability (4)
430.608 GIS and Decision Support Systems (4)
430.609 Spatial Data Management: Quality and Control (4)
430.611 Geospatial Ontology and Semantics (4)
430.613 Advanced Remote Sensing (4)
430.615 Big Data Analytics: Tools and Techniques (4)
430.618 Advanced Python Scripting for GIS (4)
430.619 Advanced Web Application Development (4)
430.621 GIS for Emergency Management (4)
470.752 Intelligence Analysis (3)
470.697 Intelligence and Counterterrorism (3)
470.6XX Human Geography for Intelligence (3)

Capstone Residential Experience (4)

430.XXX Capstone in Geospatial Intelligence (4)

2. Educational objectives and student learning outcomes

Upon completion of the M.S. in Geospatial Intelligence, students will:

- Develop critical thinking skills and learn to work effectively in a collaborative environment
- Select, use, synthesize, and demonstrate the techniques, skills, and tools necessary to solve geospatial intelligence problems
- Apply knowledge of earth image processing/remote sensing, geographic information science, and geospatial analytic processes to geospatial intelligence
- Design and implement strategies for capturing or sourcing geospatial data and any accompanying metadata as well as conduct complex analytical tasks
- Critically evaluate potential impacts of data quality on spatial analysis and decision making
- Effectively communicate what is appropriate for geospatial intelligence work; *e.g.,* be able to prepare and present reports tailored to a variety of applications.

3. General education requirements

Not applicable.

4. Specialized accreditation/certification requirements

Johns Hopkins University is seeking accreditation from the United States Geospatial Intelligence Foundation (USGIF). USGIF is dedicated to bringing together industry, academia, government, professional organizations, and stakeholders to exchange ideas, share best practices and promote the education and importance of a national geospatial intelligence agenda. Although prospective students may work in any number of organizations that generate geospatial intelligence, USGIF accreditation is critical for individuals aiming to work for or advance their careers with the National Geospatial-Intelligence Agency (NGA) or its contractors; therefore, JHU-AAP has worked with USGIF to craft the MS in Geospatial Intelligence curriculum and will seek USGIF accreditation. (See Appendix D for a USGIF letter of support.)

5. Contractual agreements with other institutions

Not applicable.

C. Critical and compelling regional and statewide need as identified in the State Plan

1. Demand and need for the program

Geospatial refers to information that is associated with a particular location. *Intelligence* refers to the collection, processing, analysis, and dissemination of information to enable decision-making by an organization. *Geospatial intelligence,* then, has a statutory definition (10 U.S.C. § 467): "the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced

activities on earth. Geospatial intelligence consists of imagery, imagery analysis, and geospatial information."

Geospatial intelligence is a rapidly growing and evolving discipline, having only existed for approximately 15 years and. Its origin is tied to the formation of the National Geospatial-Intelligence Agency, which merged the U.S. government agencies that conducted imagery intelligence with the Defense Mapping Agency, which performed mapping, charting, and geodesy.[1] However, the conceptual scope of the field has continued to grow as human geography has increasingly penetrated it. At the same time, the non-governmental producers and consumers of geospatial intelligence are rapidly growing in importance. Their growth has been enabled by the proliferation of commercial imagery satellites, non-governmental drones, handheld digital photography, cellular communication, the internet, and the maturation of the Global Positioning System.

The world of geospatial intelligence is sprawling. NGA remains the single largest government producer of geospatial intelligence. However, numerous other U.S. government agencies also work in the field, including the Federal Bureau of Investigation and departments of Homeland Security, Energy, State, Treasury, Health and Human Services, and Agriculture. Government applications of geospatial intelligence include supporting military operations, assessing foreign military operations and capabilities, the safety of aerial and maritime navigation, nonproliferation efforts, arms control treaty verification, disaster response and relief operations, human rights monitoring, environmental monitoring, civilian and military infrastructure monitoring, border security, epidemic monitoring, assessments of licit and illicit agriculture, and energy security.

The proposed curriculum is designed to train individuals to work in any sector of geospatial intelligence and to offer them a combination of technical training, critical thinking skills, and the ethical framework necessary to become effective geospatial intelligence analysts in any sector of the field in which they choose to apply their tradecraft.

2. Alignment with the 2013 Maryland State Plan for Postsecondary Education

The M.S. degree in Geospatial Intelligence will meet Goals 1, 4 and 5 of the Maryland State Plan. Goal 1 is to "Maintain and strengthen a system of postsecondary institutions recognized for academic excellence and effectiveness in fulfilling the education needs of students and the economic and societal development needs of the state and the nation." Goal 4 is to "Achieve a system of postsecondary education that promotes student-centered learning to meet the needs of all Marylanders." And Goal 5 is to "Promote economic growth and vitality through the advancement of research and the development of a highly qualified workforce." Johns Hopkins is widely recognized as a world renowned leader in education and research, and the proposed M.S. degree program continues this tradition by offering high-quality, academic certifications that allow students to develop advanced analytical skills and apply them in their desired career fields.

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[1] Murdock, D. and R.M. Clark. 2015. Geospatial Intelligence. In, *The 5 Disciplines of Intelligence Collection*, M.M. Lowenthal and R.M Clark (eds.), Sage: Los Angeles.

D. Quantifiable and reliable evidence and documentation of market supply and demand in the region and State

1. Market demand

The U.S. Department of Labor identifies the geospatial technology sector, especially geospatial intelligence, as a high growth industry in need of new professionals, especially those trained in interdisciplinary programs such as the one proposed here.[2] The field of geospatial intelligence has predicted job growth in the order of 30 percent over the next five years. Both the National Academies Press and USGIF have discussed the demand for professionals in the industry.[3,4] There are currently less than 10 graduate degree programs that include geospatial intelligence in the U.S., and only two that offer a fully online program. Accordingly, JHU-AAP proposes to create a low-residency online M.S. in Geospatial Intelligence to be accredited by USGIF.

It is anticipated that the program will attract individuals already working in the industry as well as those who seek to enter it. Students who obtain the M.S. in Geospatial Intelligence will be prepared to work in a number of sectors. Potential employers include: Department of Defense geospatial units, including the National Geospatial-Intelligence Agency; other federal agencies such as the U.S. Census Bureau, U.S. Agency for International Development, departments of Homeland Security, Interior, Energy, Treasury, Health and Human Services, Agriculture, and State; Central Intelligence Agency and the FBI; defense contracting firms; private companies selling imagery and/or analysis to governmental, commercial, and scientific consumers; domestic and international humanitarian agencies and NGOs that assess and forecast conflicts, proliferation, human rights abuses, etc.; local, regional, state, federal, and international first responders; disaster relief agencies and organizations, including charities; and environmental consulting organizations centered on land use or land cover change and assessment of changes in earth conditions.

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[2] https://www.doleta.gov/brg/indprof/geospatial_profile.cfm

[3] http://www.nap.edu/catalog/18265/future-us-workforce-for-geospatial-intelligence

[4] http://trajectorymagazine.com/2015-issue-1/item/1904-plenty-of-eyes-in-the-sky-not-enough-minds-on-the-ground.html

2. Educational and training needs in the region

The greater Washington, D.C. region is a center for geospatial intelligence analysis with numerous employers both in the public and private sectors. A program based in the area will be very attractive to prospective students. The proposed online program can also be pursued by prospective students located in other regions with a strong geospatial intelligence presence such as St. Louis, MO and Dayton, OH.

3. Prospective graduates

Initially, five to 10 students are expected, gradually climbing to 25 to 35 graduates annually.

E. Reasonableness of program duplication

1. Similar programs

To our knowledge, there are no other graduate programs in geospatial intelligence in Maryland. There are other master's degrees in Geographical Information Systems, Science and/or Technology (GIS/T), including JHU-AAP's own M.S. in Geographical Information Systems. Other graduate degrees in GIS, broadly described, are offered by the University of Salisbury and University of Maryland. The University of Salisbury has a fully online MS in GIS Management, but this degree program does not have any geospatial intelligence components and is focused solely on GIS in public administration. The University of Maryland College Park has a Master of Professional Studies in Geospatial Information Sciences offered on-the-ground and via webcam, and the University of Maryland at Baltimore County's Master of Professional Studies in GIS (offered at their Shady grove campus) is on-the-ground; neither of these programs have a geospatial intelligence component.

The JHU School of Education does offer an on-ground, cohort-based M.S. in Intelligence Analysis, open only to cleared members of the intelligence community. University of Maryland University College offers an online M.S. in Management: Intelligence Management, while the University of Maryland at College Park offers an on-the-ground graduate certificate in Intelligence Analysis in the School of Public Policy. However, none of these programs offer any training in geospatial analysis.

A number of colleges and universities around the U.S. offer undergraduate or graduate *certificates* in geospatial intelligence, which are accredited by USGIF—a critical accreditation as demanded by the labor market. Some institutions offer master's degrees in Geographic (or Geospatial) Information Systems or Technology (GIS or GIST) with embedded certificates in geospatial intelligence. There appears to be only one master's degree in geospatial intelligence, offered by George Mason University, which is offered online as well as in a residential format.

2. Program justification

The proposed program will provide students with the skills needed to perform advanced geospatial intelligence analysis for any of numerous entities involved in generating such knowledge. This includes businesses that contract with governments at all levels, government agencies themselves, organizations and institutions that use this knowledge to work in disaster relief, humanitarian missions and advocacy both domestically and internationally, and general business applications. These skills are also in demand by contractors, think tanks, and related business and consulting firms. Not only will this program build students' capacities for independent and original analysis, it will specifically prepare them to apply this acquired knowledge in real-world settings with full consideration of the ethical dimensions of their work. The coursework in the proposed program ensures that students develop facility with the most up-to-date geospatial and intelligence analytical methods to address the most pressing emergent as well as ongoing issues. JHU-AAP's existing strengths in geographic information systems, global security studies, intelligence and national security, as well as the low-residency, online format of program, will ensure a rigorous and attractive program for working professionals.

F. Relevance to Historically Black Institutions (HBIs)

Any student meeting the admissions requirements after attending an accredited institution and completing a baccalaureate degree, including any HBI, can apply to the program. The program could serve as an extension of the opportunities provided by HBIs; to our knowledge, no HBI offer an equivalent program. Johns Hopkins is strongly committed to cultural diversity and the recruitment and retention of underrepresented minority students.

G. Evidence of the Principles of Good Practice

See Appendix B for the evidence that this program complies with the Principles of Good Practice.

The Higher Education Opportunity Act (HEOA) enacted in 2008 requires that an academic institution that offers distance education opportunities to students: 1) has a process established to verify that the student who registers is the same student who participates in and completes the offering and receives academic credit for it; 2) has a process established, to verify that student privacy rights are protected; and 3) has a process established that notifies the student at about any additional costs or charges that are associated with verification of student identity.

H. Adequacy of Faculty Resources

See Appendix C for a list of faculty who will teach in the proposed program.

As with all JHU-AAP programs, the use of part-time adjunct faculty is both intentional and important. JHU-AAP is committed to marrying theory and practice, and this is particularly important in a master's program designed for current and aspiring professionals and practitioners in geospatial intelligence. It is vital that faculty have practical experience in the fields of geographic information systems, intelligence, or geospatial intelligence specifically, as

well as advanced degrees. Participating faculty have at least the equivalent of a master's degree, and more than 80 percent have a Ph.D. or other terminal degree in their field. Most of the faculty for this proposed program have already been teaching for JHU-AAP for some time.

The Geospatial Intelligence program will be managed as part of the cluster of environmental programs in JHU-AAP, overseen by the same program director and program chair. A new faculty associate program director will be hired (part-time initially; full time when the program exceeds 50 active students) to manage the day-to-day operations of the program and to teach courses in the curriculum, including the capstone. The program committee for the new program will consist of members of the current Geographic Information Systems, Global Security Studies, and National Security Studies programs.

I. Adequacy of Library Resources

The Milton S. Eisenhower Library is the university's principal research library and the largest in a network of libraries at Johns Hopkins. It is ranked as one of the nation's foremost facilities for research and scholarship. Based on the Homewood campus, the library also includes a site at the university's Washington Center. In addition to more than 3.7 million books, the libraries provide 24/7 access to a rich collection of electronic resources, including more than 121,000 print and e-journals, and more than 985,000 full-text e-books. The library's materials and services reflect the development and increasing diversification of resources used for teaching, research, and scholarship. Librarians with subject expertise serve as liaisons to the academic departments, build electronic and print collections, and provide research consultation and instructional services to meet the teaching and research needs of the university.

J. Adequacy of physical facilities, infrastructure and instructional equipment

All courses will be offered online with the exception of a capstone experience offered on campus or at an off-site facility if necessary. Existing JHU-AAP facilities are available to provide adequate access to space and equipment.

K. Adequacy of financial resources with documentation

See Appendix E for detailed financial information.

L. Adequacy of provisions for evaluation of program

JHU-AAP has an online student course evaluation process that is completed at the midterm of each semester and after the offering of each course. This process will be applied to the proposed M.S. in Geospatial Intelligence. This evaluation also includes student reviews of the faculty for each course offered. Each semester the relevant program directors evaluate the course offerings and faculty performances based on these reviews. On an annual basis, the curriculum will be reviewed by the relevant program directors, with input from the program chair, program committee, faculty, students, and administrators as appropriate to determine if new topics need to be covered or new courses developed in order to keep the program fresh and cutting edge. As mentioned above, JHU-AAP intends to seek USGIF accreditation for the program. Once obtained, USGIF accreditation must be renewed every five years.

M. Consistency with the State's minority student achievement goals

Any student meeting the admissions requirements can apply to the M.S. in Geospatial Intelligence. The program will work to help all accepted students improve their workplace competitiveness and reach their professional goals, an aim consistent with Section XIII of the State's Minority Student Achievement Goals.

N. Relationship to low productivity programs identified by the Commission

Not applicable.

Appendix A

Course List and Descriptions

430.600 Web Mapping
Web Mapping is an important foundation course in which students will become familiar with the current platforms available for delivering Web GIS and sharing geographic content over the web. Professionals in various industries often have to make information readily available and with current developments this has become easier than ever. The class offers a fundamental understanding of creating and designing web mapping applications using various approaches and platforms. Web services enabling different kinds of functionality in a web map, such as editing, geoprocessing, geocoding, image analysis, etc. will be examined. Caching base-maps and working with tiled map services will be covered.

430.601 Geographic Information Systems (GIS)
In this introductory course, students become familiar with the concepts and gain the experience necessary to appreciate the utility of Geographic Information Systems in decision-making. Topics covered include the fundamentals of data structures, geo-referencing, data classification, querying, cartography, and basic spatial data analysis. The course provides an overview of the capabilities of GIS software and applications of GIS. Class time is divided between lectures and GIS exercises that reinforce critical concepts. Students must complete a term project as part of the course.

430.602 Remote Sensing: Earth Observing Systems and Applications
This course introduces remote sensing as an important technology to further our understanding of Earth's land, atmospheric, and oceanic processes. Students study remote sensing science, techniques, and satellite technologies to become familiar with the types of information that can be obtained and how this information can be applied in the natural and social sciences. Applications include assessment of land cover and land use, mapping and analysis of natural resources, weather and climate studies, pollution detection and monitoring, disaster monitoring, and identification of oceanographic features.

430.603 Geospatial Data Modeling
This course moves beyond the fundamentals of GIS to explore the constraints surrounding data modeling as well as the methods to model spatial data. Students review current research in the field, learn relevant modeling techniques, and utilize advanced software tools for analysis. The course focuses on various kinds of spatial data, how it is collected, handled, processed, and analyzed through GIS technologies. As the term progresses, students deal extensively with different types of data presentations and the manipulation of those data in GIS models. Students develop a significant GIS project over the course of the semester and present their findings at the end.

430.604 Spatial Analysis with GIS
This course introduces students to using various techniques for solving spatial problems. The course teaches a proven process one can utilize to address common geographic inquiries including site suitability analysis, line of sight (visibility) analysis, network analysis, geo-statistical analysis, spatial interpolation, etc. Students will also learn to apply the principles of spatial statistics to address the distributional and locational aspects of spatial data within a variety of situations. Examples and assignments are drawn from many GIS applications, such as business, urban planning, public safety, public health, transportation and natural sciences.

430.606 Programming in GIS
In this course students will learn how to automate workflows and develop tools using Python scripts as well as develop web mapping applications using Application Programming Interfaces (APIs). The course is split in two sections. The first section covers Python as a scripting language which provides an easy way for automating complex GIS tasks and functionality, thus simplifying workflows and increasing efficiency. The second section teaching basic principles of developing web mapping applications utilizing JavaScript APIs. The students will learn how to develop rich, interactive web mapping applications which contain common GIS functionality such as selection, querying, geocoding, routing, editing and geoprocessing. Prerequisite: GIS.

430.607 Spatial Databases and Data Interoperability
A well-designed database is necessary to construct relevant spatial data queries. In this course, students learn the different database designs for stand-alone databases and enterprise database systems. This course examines the requirements for a GIS Decision Support System by focusing on the design of the data schema, identifying the necessary data elements and their formats, and exploring data interoperability as a designed constituent of a database. Data management routines for maintaining the spatial integrity will also be introduced. Prerequisite: GIS, Geospatial Data Modeling

430.608 GIS and Spatial Decision Support Systems
GIS can be a very effective tool to assist in making decisions for a wide range of applications at the local, regional and global scale. This course will examine the use of GIS as a spatial decision support system for systematic policy analysis and scenario modeling. Case-studies will be used from the areas of agriculture, conservation planning, homeland security, land use planning, natural disasters, transportation, urban planning and water resources. Prerequisite: GIS, Spatial Analysis with GIS

430.609 Spatial Data Management: Quality and Control
Spatial data quality is a major concern for any GIS. This course examines the nature of errors in spatial data and various aspects of spatial data quality, including positional and thematic accuracy, resolution, precision, completeness and logical consistency. The impacts of errors on the reliability of GIS-based analysis are explored. Various strategies to improve the quality of spatial data are addressed, including the use of standards for spatial data (FGDC, OGC and ISO) and data management tools. Offered once a year. Prerequisites: GIS, Geospatial Data Modeling

430.611 Geospatial Ontology and Semantics
The Geospatial Semantics and Ontologies course examines the foundations, design, and implementation of effective linked data modeling technologies and approaches for geospatial data. Linked data, based on the node-edge-node triple data model, address challenges associated with the

use of variable terms used in GIS applications, and their associations within related enterprises and information exchange over the Internet as the Geospatial Semantic Web. Students will begin their study with a general approach to semantics and ontology, and Extensible Markup Language (XML) and the Geography Markup Language (GML) extension, information interchange formats of the Internet. Coursework next focuses on Open Source data formats and Internet services for linked geospatial data, such as Resource Description Framework (RDF) and Well Known Text (WKT), and SPARQL and GeoSPARQL graph patterns for information networking. The last half of the course introduces Web Ontology Language (OWL) for control of data for semantic inference. OWL is used to build formal (logic) representations called ontologies that govern data interchange. Students will design and build a simple ontology pattern to present to the class. These basic sets of skills provide the foundation of advanced geospatial linked data applications, such as those in progress in business, publishing, research, and government. Offered once a year. Prerequisite: GIS.

430.612 Cartographic Design and Visualization
The Cartographic Design and Visualization course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, 3D mapping, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness. Prerequisite: GIS.

430.613 Advanced Remote Sensing
This course explores the various remote sensing platforms, collection systems, processing methods, and classification approaches to remotely sensed data. Discussion of image adjustment techniques, relative orientation, and geo-referencing methods are compared. Topics include hyperspectral imaging, spectral analysis, and image filtering. Prerequisite: GIS, Remote Sensing: Earth Observing Systems and Applications.

430.615 Big Data Analytics: Tools and techniques
The explosion of data collection methods from a vast array of data sources in volumes previously unimaginable has tested the limits of traditional technology, which are not able to scale to the requirements of massive data. Big Data is the field of data studies where the data is identified by very large volumes, high velocity in data generation, and data format variety. This course explores Big Data technologies while utilizing cloud infrastructures. We will discuss the characteristics and architectural challenges surrounding Big Data, and explore geo-visualization techniques of data processed using Big Data Analytics. Students will work in a cloud computing environment to build Hadoop clusters, NoSQL databases, and work with other open source technologies to process data stores like Census data, and twitter feeds. Prerequisite: GIS.

430.618 Advanced Python Scripting for GIS
This course focuses on advanced uses of Python as a scripting tool to automate workflows in GIS and to create customized applications. This includes the development of script tools, utilizing advanced ArcPy modules, working with third-party modules, implementing Python geoprocessing services, customizing GIS applications and more advanced Python functionality. Prerequisites: Programming in GIS

430.619 Advanced Web Application Development
This course is designed to provide students with advanced experience in web application development. It focuses on uses of Web APIs for developing rich and interactive web mapping applications. HTML, CSS and JavaScript as well as data and functionality from GIS web services will be leveraged to create complex web mapping applications providing end users with geocoding, routing, geoprocessing, editing and other advanced capabilities. Widgets will be examined to quickly develop solutions, but the emphasis will be placed on tasks which provide more control over server-side functionality. Conceptual and technical documentation and samples will be greatly utilized. The course will facilitate heavy engagement in the large and growing community of Web API developers. Prerequisite: Programming in GIS.

430.621 - GIS for Emergency Management
Geographic Information Systems (GIS) have become an integral part of understanding the natural hazards in our world and how emergency management agencies respond to events and mitigate the impact of disasters. Furthermore, the advent of Web GIS has helped agencies overcome many challenges previously associated with GIS in Emergency Management. This course is an opportunity to learn about the use of GIS in studying natural hazards and apply cutting edge GIS technology to help emergency management agencies in the field. In today's device-driven world, maps need to work on mobile devices so there will be an emphasis on enabling GIS in the field. You will use Web GIS to deploy maps that assist agencies with their incident command functions: Planning, Operations, Logistics, Command, and Public Information. While the industry focus will be on Emergency Management, the knowledge, skills and abilities you develop will be widely applicable in both public and private sector industries. Prerequisite: 430.601 Geographic Information Systems (GIS), its equivalent, or permission of the instructor.

406.677 Social Science and National Security and Intelligence
This course examines the role of social science in national security decision making and intelligence. The course lectures, readings and classroom discussion are intended to help students understand the ambivalent relationship between social scientists on the one hand and intelligence personnel and national security policy makers on the other. It also considers the opportunities and limitations in the ways social science could contribute to policy making and how social science has contributed to key national issues. The course will help the student become a savvy consumer of social science.

470.696 Ethics and Privacy in Intelligence Operations
This course will address the ethical dilemmas and privacy issues that challenge intelligence and government decision makers in an increasingly complex operational and technological environment. We will examine basic moral, ethical and privacy considerations from all sides at several key points in intelligence operations from collection to covert action. The course will analyze the evolving nature of privacy concerns worldwide, with an emphasis on the balance between individual rights and national security needs as executed by intelligence agencies. Students will examine the policy implications inherent in seeking to address these issues. The readings will include diverse and opposing viewpoints as well as practicums and simulations to allow debate of the key positions in 'real world' situations. Prior enrollment in the Art and Practice of Intelligence or Intelligence: From Secrets to Policy is strongly encouraged.

470.697 Intelligence and Counterterrorism
Counterterrorism is essentially an intelligence war. By definition, both sides use small forces and clandestine means, hiding their presence and activities not only from each other, but often from friends and allies as well. This course will explore the many roles of intelligence in every facet of counterterrorism, and ask students to evaluate their practical, legal, and moral effects and implications. It will also look at the terrorists own intelligence activities, and the 'intelligence race' between terrorists and counter-terrorists. There are no pre-requisites for this course. However, students would be well served to have a basic familiarity with intelligence and terrorism before the class starts.

470.719 Technical Collection of Intelligence
This course covers the application of remote sensing technology to intelligence issues to include geospatial intelligence (GEOINT), measurements and signatures intelligence (MASINT) and signals intelligence (SIGINT). It examines the tradeoffs associated with the use of different imaging, radar, and passive radiofrequency sensors and collection platforms. The methods for processing, exploiting and analyzing raw intelligence data collected by different types of sensors are discussed. The final segment of the course investigates the management issues associated with remote sensing in intelligence.

470.748 Art and Practice of Intelligence
This course will examine how what intelligence is and how it is done. It will place a strong emphasis on effort on the limits of the possible including limits on knowledge, ethical limits, and political limits. Drawing on historical examples, the course will look at the various types of intelligence collection and how they interact with each other. It will explore the analytic process and the interface between analysts and policymakers. I it will examine the connections between intelligence and policy formulation and execution in various aspects of the national security realm. The class will conclude with a brief exploration of differing concepts and practices in other countries.

470.752 Intelligence Analysis
Intelligence analysis is fundamentally about understanding and communicating what can be known, not known, and surmised, as it can best be determined, to decision makers. Students will learn the basic skills of the intelligence analysis trade and have the opportunity to practice them through work on a semester-long project with current intelligence and national security applications. Students will also grapple with the complex psychological, political, organizational, ethical, and legal issues surrounding intelligence analysis both now and in the past.

470.6XX Human Geography for Intelligence
This course provides a systematic study of the spatial patterns of human habitation of the earth. It considers the physical geography that underlies cultural development and evaluates how human use has altered the earth. It will specifically consider the impact of such phenomena as globalization, colonialism, and human-environment relationships on places, regions, cultural landscapes, and patterns of interaction. Specific topics include problems of economic development and cultural change, consequences of population growth, changing fertility rates, and international migration; impacts of technological innovation on transportation, communication, industrialization, and other aspects of human life; struggles over political power and control of territory; conflicts over the demands of ethnic minorities, the role of women in society, and the inequalities between developed and developing economies; explanations of why location matters to agricultural land use, industrial

development, and urban problems; and the role of climate change and environmental abuses in shaping the human landscapes on earth.

430.XXX Capstone Geospatial Intelligence

The capstone is the culmination of instruction and training a student receives in the MS in Geospatial Intelligence program. In the course students will be asked to perform, in real-time, data-intensive, problem-solving and/or scenario building exercise, likely in a group/ collaborative environment. The capstone experience will provide students a chance to demonstrate synthesis, collaboration, and reporting skills focused on a real world challenge, in support of better decision making on a Geospatial Intelligence challenge. The course will expose students to the traditional TCPED (tasking, collection, processing, exploitation, and dissemination) approach used in the military and intelligence communities, but will also challenge students to approach problem solving with non-linear thinking. This course will be held in Washington, D.C. and will simulate the type of application of skills gain from coursework in real-world applications.

Appendix B

Evidence of the Principles of Good Practice

(a) Curriculum and instruction

(i) A distance education program shall be established and overseen by qualified faculty.

The proposed online Master of Science in Geospatial Intelligence is submitted as part of a cluster of environmental programs in the Johns Hopkins Krieger School of Arts and Sciences' Advanced Academic Programs (JHU-AAP), which already has online M.S. programs in Environmental Sciences and Policy, Geospatial Intelligence, and Geographical Information Systems with highly-regarded and capable faculty. Additionally, the new M.S. in Geospatial Intelligence will utilize resources from the established M.A. in Global Security Studies and the certificate programs in National Security Studies and Intelligence. Most of the faculty who will be teaching in the new program already have experience teaching an online course for JHU-AAP. Any new instructors recruited to teach in this new program would be required to meet the same qualifications as those teaching in other master's degree programs in JHU-AAP, including completion of an orientation to online teaching.

(ii) A program's curriculum shall be coherent, cohesive, and comparable in academic rigor to programs offered in traditional instructional formats.

The curriculum for the online program has been designed in consultation with experts in the field to ensure its coherence and cohesiveness. All the courses in the online program will be as rigorous as any course offered in JHU-AAP in traditional instructional formats. The courses will follow the same rigor that has been applied to the online courses of the other highly successful online JHU-AAP degree programs. A formal online course development process is used to support online course development. The online course development process is overseen by the Instructional Resource Center within JHU-AAP, an academic support unit consisting of instructional technologists, trainers, and instructional designers. The process incorporates the Quality Matters™ research-based set of eight standards for quality online course design to ensure the academic rigor of the online course is comparable or better to the traditionally offered course.

(iii) A program shall result in learning outcomes appropriate to the rigor and breadth of the program.

The program learning outcomes are derived from input from faculty and professionals within the discipline, including the program instructors, program leadership and other program stakeholders.

(iv) A program shall provide for appropriate real-time or delayed interaction between faculty and students.

The M.S. in Geospatial Intelligence will be delivered using Blackboard, JHU's course management system. This platform supports asynchronous interaction between faculty and students. Students and faculty also have the option to participate in real-time interaction through weekly web-conference office hours, supported by Adobe Connect.

(v) Faculty members in appropriate disciplines in collaboration with other institutional personnel shall participate in the design of courses offered through a distance education program.

The proposed program has established a process for identifying the appropriate faculty to design an online course. All the faculty are selected based on discipline expertise, professional and teaching experience and completion of an online course development training course.

(b) Role and mission

(i) A distance education program shall be consistent with the institution's mission.

See section A.1 of the proposal.

(ii) Review and approval processes shall ensure the appropriateness of the technology being used to meet a program's objectives.

All the courses in the program are designed with the support of an instructional designer, instructional technologists, and multimedia specialists. The instructional designer and multimedia specialists serve as instructional technology consultants to assist in identifying and recommending the most effective learning technologies for accomplishing the course's learning objectives. The course instructor and instructional designer identify all of the learning components of the course, and how the course will be facilitated to achieve the most optimal learning outcome for the students. This is an iterative process whereby the course goes through several levels of review prior to the course actually being developed. Once the course is complete, it undergoes external review using Quality Matters™ online course pedagogic quality criteria. When the course launches (goes live), the design team continually monitors it, and consults with the instructors to make adjustments to the course, if needed. All new online courses participate in a mid-term and end-of-term course evaluation process. The mid-term feedback is used to determine if any mid-point term corrections are needed. And the end-of-term evaluation is used to assess whether further course refinements are needed prior to the next time the course is offered.

(c) Faculty support

(i) An institution shall provide for training for faculty who teach with the use of technology in a distance education format, including training in the learning management system and the pedagogy of distance education.

Faculty in this program are supported by JHU-AAP's Instructional Resource Center (IRC), the JHU-AAP Office of Faculty and Student Services, as well as the program director and associate director. The IRC provides oversight for all online course developments, including faculty training and development. The IRC has a formal, structured faculty development approach for preparing faculty to develop and teach an online course. All faculty are required to complete at least three Blackboard training sessions and a course in the use of Adobe Connect. These training sessions provide an overview of online learning pedagogy and introduce the faculty to some of the technologies they will be using to develop their online courses. Faculty may also sign up for one-on-one training sessions with staff of the IRC, attend faculty development sessions provided by the Office of Faculty and Student Services, and consult with the faculty in the other environmental courses for additional pedagogical or technical support. A third-party help desk as well as internal help desk consultants also assist in faculty technical support.

(ii) Principles of best practice for teaching in a distance education format shall be developed and maintained by the faculty.

The IRC offers training on how to be an effective online instructor based on best practices from research and other related sources. All new online instructors are required to participate in this training prior to teaching their first online course.

(iii) An institution shall provide faculty support services specifically related to teaching through a distance education format.

The IRC provides a wide range of faculty support services for faculty engaged in online instruction. Faculty have access to multimedia specialists, instructional designers, technical trainers, and a 24/7 technical help desk to provide the necessary support required to effectively deliver distance education programs. In addition, JHU- AAP offers faculty development training opportunities in online pedagogy and new instructional technologies throughout the year specifically designed for online instructors.

(d) An institution shall ensure that appropriate learning resources are available to students including appropriate and adequate library services and resources.

The students will have online access to the Milton S. Eisenhower Library, ranked as one of the nation's foremost facilities for research and scholarship. Its collection of 3.7 million bound volumes, 121,000+ print and e-journals, and 985,000+ e-books support the university's academic and research enterprise. The interlibrary loan department makes the research collection of the nation available to faculty and students. The library provides easy access to a wide selection of electronic information resources, including the library's online catalog, and numerous electronic abstracting and indexing tools. These databases are accessible remotely. Librarians help students electronically and the library maintains an extensive web site to take visitors through all of its services and materials. Online chats and other services are available to distance students as is mail-service of hard-copy only materials.

(e) Students and student services

(i) A distance education program shall provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.

JHU-AAP maintains numerous web-based resources to inform prospective students about the information they may need as an online student. These resources include the JHU-AAP website at http://advanced.jhu.edu and the JHU-AAP online catalog, which includes detailed programmatic information, academic support services, financial aid, costs, policies, and specific information for online learning. As new online students are admitted and enrolled, they receive timely emails with important information to help them prepare to become an online student. These emails include information on how to create their JHU log-in account for the course management systems, technical requirements, available academic support services and new online student orientation course.

(ii) Enrolled students shall have reasonable and adequate access to the range of student services to support their distance education activities.

JHU-AAP online students have access to the following academic support services:

- **Academic Advising.** Students are assigned an advisor when admitted. Students work individually with the advisor to develop a course of study that meets the requirements of the program and the career goals of the student. The advisor contacts all the students each semester to check on progress and answer questions. Courses that deviate from the program plan and have not been approved by an advisor may not count toward degree requirements.
- **Library Services.** Students have online access to the Milton S. Eisenhower Library, ranked as one of the nation's foremost facilities for research and scholarship. The interlibrary loan department allows students access to resources at any other university in the nation. The library provides easy access to a wide

selection of electronic information resources, including the library's online catalog, and numerous electronic abstracting and indexing tools. Many of the databases are accessible remotely. Librarians are available to assist students remotely and the library maintains an extensive web site to take visitors through all its services and materials.

- **Services for Students with Disabilities.** The Johns Hopkins University is committed to making all academic programs, support services, and facilities accessible to qualified individuals. Students with disabilities who require reasonable accommodations can contact the AAP Disability Services Administrator, aapdisability@jhu.edu .
- **Johns Hopkins Student Assistance Program:** The Johns Hopkins Student Assistance Program (JHSAP) is a professional counseling service that can assist students with managing problems of daily living. Stress, personal problems, family conflict, and life challenges can affect the academic progress of students. JHSAP focuses on problem solving through short-term counseling. Accessing the service is a simple matter of a phone call to arrange an appointment with a counselor. Online students may call a phone number for consultation and will be directed to the appropriate resource or office. JHSAP services are completely confidential. The program operates under State and Federal confidentiality legislation and is HIPAA compliant.
- **Transcript Access**. Official transcripts will be mailed upon written request of the student at no charge.
- **Student ID JCard**. The JCard serves as the student's university identification card. This card is mailed to the home address of every registered student. The JCard acts as the university library card and provides access to student software discounts where available.

(iii) Accepted students shall have the background, knowledge, and technical skills needed to undertake a distance education program.

Prior to admission into an online program, prospective students are invited to "test drive" a course to determine if the online learning environmental is suitable to their learning style. Accepted online students must meet the admissions requirements of graduate students in JHU-AAP and the specific requirements of the M.S. program. New online students are required to complete the "New Online Student Orientation" course prior to beginning their first online course. This course covers a broad range of topics on how to be a successful online student such as, Blackboard basics, online student learning expectations, how to access the library, how to conduct online research, and how to participate in online discussions.

(iv) Advertising, recruiting, and admissions materials shall clearly and accurately represent the program and the services available.

All relevant program information is keep up to date on the JHU-AAP web site.

(f) Commitment to support

(i) Policies for faculty evaluation shall include appropriate consideration of teaching and scholarly activities related to distance education programs.

Faculty teaching online courses are strongly encouraged to participate in at least one to two professional development opportunities annually to improve their online teaching skills. They are also encouraged to embrace the scholarship of teaching relevant to online instruction.

(ii) An institution shall demonstrate a commitment to ongoing support, both financial and technical, and to continuation of a program for a period sufficient to enable students to complete a degree or certificate.

JHU-AAP has a commitment to online teaching as demonstrated by the resources in its Instructional Resource Center that provide course development, instructional, and technical support to new and current faculty.

(g) Evaluation and assessment

(i) An institution shall evaluate a distance education program's educational effectiveness, including assessments of student learning outcomes, student retention, student and faculty satisfaction, and cost-effectiveness.

JHU-AAP has an online student course evaluation process that is completed at the midterm of each semester and after the offering of each course. This process will be applied to the proposed M.S. in Geospatial Intelligence program. This evaluation also includes student reviews of the faculty for each course offered. Each semester the director for the program evaluates the course offerings and faculty performances based on these reviews. On an annual basis, the curriculum will be reviewed by the chair, program director, faculty, and administrators as appropriate to determine if new topics need to be covered or other changes made following JHU-AAP procedures for such review. Formal processes for academic program review of JHU-AAP graduate programs are also in place.

(ii) An institution shall demonstrate an evidence-based approach to best online teaching practices.

The JHU-AAP Instructional Resource Center, which offers instructional design and faculty support staff, continually participates in professional development activities to keep abreast of evidence-based approaches to online teaching practices. These online teaching practices are then incorporated into the new online instructor training sessions.

(iii) An institution shall provide for assessment and documentation of student achievement of learning outcomes in a distance education program.

As part of the online course design process in JHU-AAP, course assessments are required to be aligned with stated course learning outcomes. The new online program option for the M.S. in Geospatial Intelligence proposed here will incorporate authentic-based learning assessments that demonstrate student's application of learned concepts.

Appendix C

Representative Faculty

Thomas Haine, Ph.D. (full-time), Program Chair for Geographic Information Systems and Morton K. Blaustein Chair and Professor, Department of Earth and Planetary Sciences. Dr. Haine is a well-known scholar on ocean circulation and the ocean's role in climate, and his research focuses on improving estimates of the geophysical state of the ocean circulation through analysis of field data and circulation model results, particularly in high latitude oceans. He provides overall guidance and academic oversight for the proposed degree program.

Benjamin Ginsberg, Ph.D. (full-time), Program Chair for Global Security Studies, Center for Advanced Governmental Studies and David Bernstein Professor of Political Science. Dr. Ginsberg is a well-known scholar and his books on American politics are highly regarded. The textbook on American government that he co-authored is the most widely used text in the nation. He provides overall guidance and academic oversight for the proposed degree program.

Steven David, Ph.D. (full-time), Program Chair, National Security Studies and Professor, Department of Political Science. Steven R. David is a professor of international relations whose work focuses on security studies, the politics of the developing world, American foreign policy, and turmoil in the Middle East. David's scholarship emphasizes the impact of internal politics on foreign policy, particularly among developing countries.

Antoinette WinklerPrins, Ph.D. (full-time), Director for Environmental Programs in JHU's Advanced Academic Programs. This program cluster includes M.S. degrees in Environmental Sciences and Policy (ESP), Energy Policy and Climate (EPC), and the M.S. and Certificate Programs in Geographical Information Systems (GIS). She is a geographer with cross-disciplinary training in human as well as physical geography and is known for her work on issues of environmental knowledge and agricultural management systems, livelihoods, and anthropogenic soils. Her Ph.D. is from the University of Wisconsin-Madison and she did a post-doc at the University of Twente, in the Netherlands. She teaches online, onsite, and field-based courses in agriculture and food systems, climate change adaptation, and sustainability science. She will be developing the course on human geography for this program.

Mark Stout, Ph.D. (full-time), Program Director, M.A. in Global Security Studies, Certificates in National Security Studies and Intelligence. In directing these programs and contributing to this proposed M.S. in Geospatial Intelligence degree, Mark draws on his deep understanding of intelligence both in theory and practice. He teaches one of the most popular electives in the Global Security Studies Program called "Art and Practice of Intelligence" and has been awarded the Instructor of the Year in the recent past. Other relevant courses he currently teaches includes "Intelligence, War, and Political Conflict;" "National Intelligence Systems: A Comparative Study;" and "Military Strategy and National Policy."

Geri Miller, M.S. (full-time), Faculty Program Coordinator, Geographic Information Systems Program. Geri has been with the GIS program at JHU-AAP since its inception. She has developed and taught a range of the GIS curriculum, including AS.430.600 Web Mapping, AS.430.603 Geospatial Data Modeling, AS.430.604 Spatial Analysis with GIS, AS.430.606 Programming in GIS and AS.430.617 Demographics Modeling. She is a GIS Instructor at Esri (Environmental System Research Institute) since 2007 specializing in the online delivery of Desktop, Server and Programming GIS classes.

Heather Hicks, M.S. (part-time), has been an instructor in the JHU GIS programs since its inception, also acting as a consultant in the establishment of the program. She has developed and taught a range of the GIS curriculum, including the introductory GIS and RS courses, as well as a course on the development and management of GIS project. Her other courses include GIS in Environmental Applications, GIS in Natural Hazards, GIS in Natural Resources, Conservation GIS, Natural Hazards of Hawaii, and GIS Analysis: Theory and Practice. Heather has a B.S. and a B.A from the University of Delaware and a M.S. from the University of Denver, is completing a Ph.D. at Colorado State University, and is a certified GISP with over 20 years of experience in the GIS and Environmental fields.

Penelope Mitchell, M.S. (part-time), is an instructor for the JHU GIS program, teaching AS.430.612 Cartographic Design and Visualization. She is a graduate of the University of West Florida's Environmental Studies B.S., Graduate GIS Certificate, and Environmental Science M.S. Program. Penelope previously worked with the Florida Department of Environmental Protection utilizing GIS in the field of ecological restoration.

Jon Ranson, Ph.D. (part-time), has taught the Principle of Remote Sensing course for several years. He currently is the Chief of the Biospheric Sciences Laboratory at NASA's Goddard Space Flight Center. He received the B.S. degree in Watershed Sciences and M.S. degree in Earth Resources from Colorado State University where his graduate research involved use of Skylab and Landsat MSS data for geologic and forest cover mapping. He later joined the Laboratory for Applications of Remote Sensing (LARS) at Purdue University where he earned the Ph.D. degree.

John Gans, Ph.D. (part-time), is currently a speechwriter for the Secretary of Defense. At JHU, Gans has taught the American National Security course, an Introduction to International Politics course, and a seminar on the Politics and Process of American Foreign Policy. In 2013 and 2014, he planned and led the AAP Crisis Simulation. Gans is also Public Affairs Officer (PAO) and part of the United States Fleet Forces Command reserve component at Naval Station-Norfolk. He recently finished serving as a researcher at the National War College, part of the National Defense University and the Department of Defense, in Washington, DC. Gans received his PhD from SAIS in 2015. He graduated from Northwestern University with a BS.

Todd Helmus, Ph.D. (part-time), is a faculty member at Johns Hopkins University where he teaches "Social Science, National Security and Intelligence." He is also a senior behavioral scientist at the RAND Corporation where he specializes in irregular warfare, counterterrorism, and security cooperation. Helmus's research has addressed the causes of militant recruitment and radicalization, new operational templates for counterinsurgency, best practices for partner capacity building and U.S. Policies to counter violent extremism. He received his Ph.D. in clinical psychology from Wayne State University.

Appendix D

Letter of Support from the United States Geospatial Intelligence Foundation (USGIF)

"Where Our National Security Begins..."

www.usgif.org

24 November 2015

Associate Dean Kathleen Burke
Advanced Academic Programs
Johns Hopkins University
1717 Massachusetts Ave., NW
Washington D.C. 20036

Dear Dean Burke,

The **United States Geospatial Intelligence Foundation** (USGIF) is working with colleagues in three **JHU Advanced Academic Programs (Geographic Information Systems, Global Security Studies,** and **National Securities Studies)** to develop a new ***Master of Science in Geospatial Intelligence*** at Johns Hopkins University. This program will support rapidly growing workforce development needs across the federal geospatial intelligence enterprise, including both government and industry partners.

I have reviewed a draft of the new program proposal, and can affirm that this proposed program aligns well with 21st century geospatial intelligence (GEOINT) workforce development requirements. In addition to hitting requisite standards/competency targets for pillars of geospatial discipline (geographic information science, remote sensing, data visualization, data management), the proposed Johns Hopkins MS in GEOINT program will have superior specialized intelligence studies capabilities to competitively attract graduate students from existing federal GEOINT workforce.

USGIF has been accrediting collegiate Geospatial Intelligence Programs for eight years on behalf of our government and industry partners (http://usgif.org/membership/our-members). USGIF accreditation provides quality assurance to these government and industry employers that our programs meet internationally recognized standards/competencies, including the *Universal GEOINT Essential Body of Knowledge* recently developed for the new *Universal GEOINT* professional credential. You are welcome to contact me directly with any questions you might have regarding USGIF and GEOINT community interest in this important new program.

Sincerely,

R. Maxwell Baber, Ph.D., FBCart.S
Director of Academic Programs

2325 Dulles Corner Boulevard | Suite 450 | Herndon, VA 20171 | 703.793.0109

Appendix E

Finance Information

TABLE 1: RESOURCES:					
Resource Categories	**2016**	**2017**	**2018**	**2019**	**2020**
1. Reallocated Funds	-	-	-	-	-
2. Tuition/Fee Revenue (c + g below)	270,000	548,100	932,715	1,271,072	1,640,933
a. Number of F/T Students	0	0	0	0	0
b. Annual Tuition/Fee Rate					
c. Total F/T Revenue (a x b)					
d. Number of P/T Students	15	29	47	61	75
e. Credit Hour Rate	900	945	992	1042	1094
f. Annual Credit Hours	20	20	20	20	20
g. Total P/T Revenue (d x e x f)	270,000	548,100	932,715	1,271,072	1,640,933
3. Grants, Contracts & Other External Sources	10,000	15,000	-	-	-
4. Other Sources	-	-	-	-	-
TOTAL (Add 1 – 4)	**280,000**	**563,100**	**932,715**	**1,271,072**	**1,640,933**

Resources narrative

1. Reallocated Funds: No funds will be reallocated from existing campus resources.

2. Tuition and Fee Revenue: Initially based on the enrollment of 15 students and gradually climbing to 50+ students. The program anticipates graduating 5-10 students initially and gradually climb to 25-35 annual graduates.

3. Grants and Contracts: Grants or contacts that will provide resources for this program are included for the first two years.

4. Other Sources: The program does not expect any funding from another source.

TABLE 2: EXPENDITURES:					
Expenditure Categories	**2016**	**2017**	**2018**	**2019**	**2020**
1. Faculty (b + c below)	94,944	151,698	239,460	281,850	317,760
a. # Sections offered	-	-	-	-	-
b. Total Salary	80,550	133,100	207,000	246,250	279,500
c. Total Benefits	14,394	18,598	32,460	35,600	38,260
2. Admin. Staff (b + c below)	-	-	-	-	-
a. # FTE	-	-	-	-	-
b. Total Salary	-	-	-	-	-
c. Total Benefits	-	-	-	-	-
3. Support Staff (b + c below)	-	-	-	-	-
a. # FTE	-	-	-	-	-
b. Total Salary	-	-	-	-	-
c. Total Benefits	-	-	-	-	-
4. Equipment	-	-	-	-	-
5. Library	-	-	-	-	-
6. New or Renovated Space	600	600	600	600	600
7. Other Expenses	14,500	20,700	7,200	8,400	8,400
TOTAL (Add 1 – 7)	**$110,044**	**$172,998**	**$247,260**	**$290,850**	**$326,760**

Expenditures narrative:

1. Faculty: Current adjunct salary is $5,000 per course. For the first three years of the program, costs will consist of that salary (plus possible minor annual increases) for each of the courses offered plus online course development fees.

2. Administrative: No additional resources needed.

3. Support Staff: No additional resources needed.

4. Equipment: No additional resources needed.

5. Library: No additional resources needed.

6. New or Renovated Space: Additional funds included for future renovations.

7. Other Expenses: Indirect program costs are provided here.