KENT STATE UNIVERSITY
CERTIFICATION OF CURRICULUM PROPOSAL

Preparation Date **11/4/2014**   Curriculum Bulletin _____

Effective Date   **Fall 2015**   Approved by EPC _____

Department	**Geography**
College	**AS - Arts and Sciences**
Degree	
Program Name	**Master of Geographic Information Science** Program Banner Code
Concentration(s)	Concentration(s) Banner Code(s)
Proposal	**Establish program**

Description of proposal:

The curriculum meets the needs of individuals who are interested in professional careers in Geographic Information Science (GISc) and for those who would like to further their current career with GISc training, particularly in information services, environmental or health sciences in both public and private sector positions. Students are exposed to theories, techniques, and applications across GISc, which prepare them for positions ranging from analysts through to management in industries that utilize geospatial data and technologies.

The proposed start date is Fall 2015 with admission every fall, spring, and summer semesters. The program is fully online and courses run for 7 weeks; up to 30 students will be accepted into the program each semester. The MGISc is a 32 hour program with 17 core hours, 9 hours in the student's chosen concentration, and then 6 hours of electives. The curriculum is designed to be completed in under 2 years. Admission requirements include an undergraduate baccalaureate degree from an accredited institution in a cognate field, a minimum 3.0 GPA. No GRE will be required and the admission process is the same as current graduate programs. This program is an Everspring Collaboration and Everspring will handle all marketing and will be the initial point of contact for all potential applicants.

Does proposed revision change program's total credit hours?   ☐ Yes   ☒ No

Current total credit hours: **32**   Proposed total credit hours **32**

Describe impact on other programs, policies or procedures (e.g., duplication issues; enrollment and staffing considerations; need; audience; prerequisites; teacher education licensure):

No duplication issues have been identified by the units consulted (please see below). There will be no impact to staffing other KSU units. Those courses from other units offered as electives may see some increases in enrollment, but as we understand, this is not an issue. Everspring has conducted a market study to identify need and audience; pending approval, they will design the marketing plan accordingly.

Units consulted (other departments, programs or campuses affected by this proposal):

Department of Geology, Department of Biological Sciences, Department of Computer Science, School of Digital Sciences, College of Public Health

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REQUIRED ENDORSEMENTS

_____   11 / 4 / 14

Department Chair / School Director

_____   __ / __ / __

Campus Dean (for Regional Campuses proposals)

GEOG
35

Mary Ann Haley
College Dean (or designee)

12.5.14

Mary Bu Stephen
Dean of Graduate Studies (for graduate proposals)

2.5.15

_____
Provost and Senior Vice President for Academic Affairs (or designee)

___/___/___

GEOG
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New Graduate Degree Program Full Proposal
[Master of Geographic Information Science (MGISc)]

1. **Academic Quality:** Competency, experience and number of faculty and adequacy of students, curriculum, computational resources, library, laboratories, equipment and other physical facilities, needed to mount the program.

OVERVIEW

This proposal outlines an exciting new opportunity for professionals interested in Geographic Information Science in the State of Ohio, as well as nationally. In particular, our program is designed for professionals in the health, data science, and environmental science sectors. We propose to offer a 32 credit hour ***fully online*** Professional Master of GISc with concentrations in CyberGIS, Health and GIS, and Environmental GIS. This will be the fourth fully online program to be launched nationally. All courses will be taught on a 7 week schedule (apart from the final course, practicum, which will be 14 weeks long). The program will have three admission periods each year (start of Fall, Spring and Summer). The curriculum offerings are designed in such a way that students will take one course at any given time and can complete the entire degree in 5 academic semesters. The courses in the degree will be offered in such a pattern that if a student decides to take a 7 week break, they can start back into the program in the following 7 week segment.

All core and concentration courses will be taught by full-time faculty in the department of Geography. Electives will be available from Geography, Computer Science and Digital Sciences.

This program may be desirable to students with Geography undergraduate degrees, but market analysis shows that the program will be more attractive to working professionals likely to have degrees in affiliated fields, but not geography. Thus this program introduces individuals to the basics of GIS and geospatial principles and quickly escalates students to high end problem solving using GIS. The program culminates in a practicum which is designed to provide practical experience in the application of MGISc course content in real-world professional settings.

CURRICULUM

Our proposed curriculum consists of 32 hours of rigorous curriculum. There are 16 hours of core curriculum for all students; 9 hours of required concentration courses; and 6 hours of electives

In brief, the core courses are:

- **GEOG 59070 Geographic Information Science (4 credits)** Introduction to theories and methods for geographic data processing, including data capture and input, data storage and management, and data analysis and displays. Emphasis is on laboratory exercises using GIS software packages for real world applications.

- **GEOG 59080 Advanced Geographic Information Science (3 credits)** Advanced theories and techniques for handling geographic information systems, including 2D and 3D processing of geographic information, detection and analysis of geographic patterns, 2D and 3D mapping of geographic information, modelling of geographic processes, and an overview of GIS programming tools.

- **GEOG 69164 Cartographic Design (4 credits)** This course builds on students' experiences with GIS to focus on the design needed to disseminate information beyond users of the software and produce effective print and web maps. Principles of map design and the art of map construction will be taught. Concepts such as scale, projections, typography, generalization, symbols, color scheme, and classification to the design and production of thematic maps will be covered.

- **GEOG 69392 Practicum in Geographic Information Science (6 credits)** This course represents the culminating experience for students in the MGISc program. It will be taken in place of two Carousel/Specialist courses on the schedule for the student's final semester. It is designed to provide practical experience in the application of MGISc course content in real-world professional settings. Students will select a professional project in consultation with their employer and program faculty and then will design, implement, and report on their activities in a culminating professional paper.

THE CONCENTRATION REQUIREMENTS ARE:

FOR CYBERGIS

- **GEOG 59076 Spatial Programming (3 credits)** Introduces the student to a variety of computer programming environments suitable for the analysis of spatial problems.

- **GEOG 69082 CyberGIS (3 credits)** Explores cyberinfrastructure-enabled geographic information systems (i.e. cyberGIS) and related technologies including a broad introduction to the use, design, and development of cyberinfrastructure, spatial data infrastructures, geographic information services, and web-enabled mapping technologies. Situates CyberGIS in the broader context of geographic information science focusing on the how synthesizing computational thinking and spatial thinking influence methodological approaches.

- **GEOG 69083 Geodatabases (3 credits) e**ssential concepts and skills needed to efficiently create a geodatabase, add data to it, and realistically model the real-world spatial relationships inherent to the data. Students will learn about geodatabase features that help ensure data integrity over time and about storing and managing geographic data.

FOR ENVIRONMENTAL GIS

- **GEOG 59078 Geographic Information Science and Environmental Hazards (3 credits)** The study and management of natural hazards are inherently reliant on both physical and human processes and spatial patterns. Given the many variables involved and the variety of scales at which they operate, use of Geographic Information Systems (GIS) has become standard practice in research on hazards and in their management by government agencies at all levels. Exposes students to a wide array of spatial data that is used in these activities, as well as standard mapping and spatial analysis procedures and forms of data dissemination.

- **GEOG 69079 Environmental Geographic Information Science (3 credits)** GPS and environmental spatial data are commonly used in a variety of management and assessment plans in fields related to environmental science to achieve effective decision making and environmental resource management. This course will focus on techniques used to process, manage, visualize, and analyze environmental data using GIS. Students will learn how to

collect and process GPS and online sources of geospatial data and how to employ techniques such as suitability modeling, measuring distributions, and calculating landscape metrics.

- **GEOG 69231 Environmental Remote Sensing (3 credits)** Students are introduced to the basic principles of environmental remote sensing, including the electromagnetic spectrum, spectral properties of Earth objects, aerial photograph analysis and interpretation and satellite image analysis and interpretation. Special focus will be on environmental applications, especially as they pertain to understanding vegetation, water, and land use mapping and impacts.

FOR HEALTH AND GIS

- **GEOG 59072 Geographic Information Science and Health (3 credits)** Geographic theory and methods serve as the connection among disparate disciplines focused on how and why "health" varies between regions, cities, and neighborhoods. Examines how geospatial technologies, especially GIS, have become an important health analysis tool.

- **GEOG 69073 Geographic Information Science: Global Health (3 credits)** Emerging and re-emerging diseases in non-developed countries pose one of the greatest health challenges of current times. Geospatial approaches often provide one of the only information sources in data poor and challenging environments. This course will expose students to these health issues and disease environments through varied case studies, while simultaneously highlighting the geospatial methods and approaches used to understand and combat disease.

- **GEOG 69074 Spatial Analysis for Health Geography (3 credits)** Spatial analysis is used to verify patterns and associations in health data maps. These results can then be used to further hone the scientific question, or help design an intervention strategy. This course will introduce spatial analytical approaches used by health researchers and practitioners in the exploratory investigation of health data. Students will also be exposed to new mobile technologies that can be used to enrich more traditional spatial data sources.

ELECTIVES: STUDENTS WILL TAKE 2 COURSES (NOTE THAT COURSES LISTED AS REQUIRED IN CONCENTRATIONS MAY ALSO COUNT AS ELECTIVES FOR OTHER CONCENTRATIONS). ADDITIONAL ELECTIVES INCLUDE:

- **GEOG 69004 Quantitative Methods (3 credits)** This course explores the methods and applications of some of the most common statistics found in geographic work. It explores probability theory, spatial statistics, estimation procedures, hypothesis testing, spatial sampling, methods of areal association, correlation and regression analysis, and principal components analysis. Theory and execution of these methods are equally emphasized, and applications to geographic problems are examined within each theme.

- **GEOG 69007 Spatiotemporal Analytics (3 credits)** This course will equip the students with essential spatiotemporal thinking and technical skills in mapping, analyzing, visualizing, communicating, and simulating the spatiotemporal data. ArcGIS and free packages in R and Netlogo will be used in the instruction.

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- **DSCI 64210 Data Science (3 credits)** Introduction to the concept of big data and data analytics, including the business challenges of working with big data. Students are introduced to the concepts of both structured and unstructured data. Fundamental concepts include data design and management, database design and management, data driven programming and discovery, and data presentation and use. Data analytics in industry verticals are discussed, including science, intelligence and law enforcement, health, retail and financial services.

- **CS 61002 Algorithms and Programming I (4 credits)** An introduction to the algorithms and tools used in computer science; includes programming in a high level language.

- **CS 61003 Algorithms and Programming II (4 credits)** Further exploration into the tools used in computer science.

OUR FACULTY

All of our faculty hold a PhD in Geography or a related field, and all are recognized experts in their respective areas in the geospatial sciences (see attached CV's). Our proposed program is built around both faculty expertise, and around a growing need for such a professional program.

Name	Rank	Status	Highest Degree	Degree Date	Field	Expertise
Andrew Curtis	Associate Professor	Tenure Track	Ph.D.	1995	Geography	public health, spatial confidentiality,
Jacqueline W. (Mills) Curtis	Assistant Professor	Tenure Track	Ph.D.	2005	Geography	public health, hazards, built environment
Jay Lee	Professor	Tenured	Ph.D.	1989	Geography	geospatial analysis
Jennifer Mapes	Assistant Professor	Non-tenure Track	Ph.D.	2009	Geography	geovisualization
Mandy Munro-Stasiuk	Professor	Tenured	Ph.D.	1999	Geography	remote sensing
Eric Shook	Assistant Professor	Tenure Track	Ph.D.	2013	Geography	cyber-GIS
Emariana Taylor	Assistant Professor	Non-tenure Track	Ph.D.	2009	Geography	urban ecology, computational modeling
Xinyue Ye	Assistant Professor	Tenure Track	Ph.D.	2010	Geography	web-GIS, mobile applications

RESOURCES

2. computational resources, library, laboratories, equipment and other physical facilities, needed to mount the program.

We are well-positioned at Kent State to offer this proposed fully online program. While this is a very technically intensive program to offer via distance learning, we have been preparing for this for three years and have considerable expertise in delivering DL hands-on content.

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Since this proposed program has been designated as a strategic initiative of Kent State University, we have access to an entire design and marketing team. Every course is developed for online delivery via an intensive collaboration between one or two faculty members (offering content expertise) and an online course developer (offering online design expertise and access to a full suite of course development tools). Every course will be Quality Matters certified via this process. This is a rigorous certification that involves every course being reviewed by a 3 person review team (at least one external to KSU; and at least 1 being an expert in the course content). Every course must be a high touch environment, just like in a face-to-face environment. None of the three existing three online GIS programs (Penn State; USC; Johns Hopkins) are Quality Matters certified. All courses will be delivered via Blackboard.

We are utilizing a virtual machine (VM) model. Our servers are sufficient to support the number of VMs for simultaneous access by students in the program. By using the VM model, we will fully replicate our current computer lab PC configurations providing online students with the same access as our face-to-face students. This is important, as students will not need to worry about installing and managing complex GIS software on their own machines; they will simply log in to a VM and have access to everything. We are currently licensed in ArcGIS, ENVI, Idrisi, ERDAS, Microsoft Office and a plethora of other software packages.

Our program and the students in the program will have access to technical support at a number of levels:

- The department of Geography has a dedicated IT support line. This will help troubleshoot any specific geospatial IT issues, and they will manage all VM access and other permissions;

- Blackboard has built in IT support for Blackboard issues;

- The VMs will be maintained by centralized Information Services (IS); and

- Data storage and access will also be maintained by IS

We are working with the company Everspring who will help market and advertise our program.

With no additional resources we are ready to launch this program.

a   In addition to the analysis given in the statement after "Academic Quality" for **professional graduate degree programs,** academic quality assessment will also focus on the adequacy of the answers provided in response to the following questions: ***Delete this section if your new program is not a professional degree.***

i   What admission criteria, in addition to the traditionally required transcripts, standardized test scores, letter of recommendation, and personal statements of purpose, are relevant to assess the potential for academic and professional success of prospective students?

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Will there be special consideration of student experience and extant practical skills within the admission process? If so, please elaborate.

If a potential applicant has a baccalaureate in a field unrelated to Geography, Health, Data /Computer Science or Environmental Science, we may accept work experience in lieu of that degree. We would expect a minimum of 3 years of work experience and applicants must outline in their letter of application how their work experience would prepare them for entry into the MGISc. The application would be reviewed by the GIS graduate committee and an admission decision would be based on a vote.

ii   Is field/clinical experience subsumed within the academic experience? If so, how does that experience relate to the academic goals of the professional graduate degree program? Provide a description of the involvement of supervisory personnel. Describe the nature of the oversight of the field/clinical experience by the academic department. Provide an outline of the anticipated student activities as well as student requirements.

Field experience is required through the culminating capstone course, Practicum (6 hours). Practicum is designed to enable the student to apply his/her training from coursework in the MGISc program to a professional project in his/her job. A final report will be submitted to the employer and to a GISc faculty advisor. In addition a version of that final project will be presented at a relevant public or industrial meeting or at a professional conference.

iii Are the faculty qualifications associated with the professional graduate degree program appropriate for such faculty? Provide the specific qualifications for such faculty.

All program faculty have the terminal degree in their field (Ph.D.) and all have extensive experience in using GISc across the public and private sector. They possess formal education appropriate to the specialization. They hold a degree one level above the program in which they are teaching; they also demonstrate practical experience other than teaching and show evidence of professional development in the field of concentration through their activities in contracts, grants, and consulting. All CVs are included with this proposal

iv   How does accreditation by the appropriate professional organization relate to the academic curriculum and experience outlined in the program plan? Describe the specific aspects of the program plan, if any, that are necessary to achieve professional accreditation. Is completion of the degree program required for professional accreditation in the field?

No specific accreditation is required in GISc.

v   How are theory and practice integrated within the curriculum?

The following programmatic objectives have been formulated in consultation with the Kent State University Office of Distance and Continuing Education and are specifically designed to integrate theory with practice throughout the curriculum:

1.   Collect, edit, integrate, manage, and analyze geospatial data.

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2. Demonstrate skills and working knowledge of commercial and open source GIS application suites and utilities.
3. Identify, explain, and analyze spatial patterns, relationships, and processes.
4. Apply cartographic principles and techniques to create quality maps.
5. Apply critical and spatial thinking to solve geospatial problems with respect to theories, principles, and practices of geographic information science and fields in the degree concentration areas.
6. Demonstrate good communication skills and ability to work in a team environment.

These objectives have been designed to facilitate the integration of theory with practice throughout all courses in the program. While outcome five explicitly focuses on theory and real world problem solving, this tenet is implicit in all other objectives. Indeed, even the most ostensibly straightforward GISc practices, such as collecting geospatial data (e.g., as described in outcome one), cannot be effectively implemented without a solid theoretical background in data representation and models. Furthermore, this program has been designed to align with the Geospatial Technology Competency Model (GTCM)[1] and the GIS&T Body of Knowledge[2] which provide frameworks for integration of theory with practice.

vi What is the national credit hour norm for this degree program in your field? How was this norm derived? Is the number of credit hours required for graduation influenced by mandated professional experiences? If so, how?

Figure 1 provides the results of the Everspring Market Study in its analysis of competitive programs. The top three programs are the only ones that are fully online, like the proposed KSU program. Among these, the required credit hours are 35 (Pennsylvania State University), 28 (University of Southern California), and 30 (Johns Hopkins University), which results in an average of 31 hours. According to the Everspring data (Figure 1), the median number of hours for regional face to face programs is 35, while the median for online programs is 30. The MGISc falls within the range presented by these schools with 32 required credit hours.

The number of credit hours required for graduation is not influenced by mandated professional experiences.

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[1] http://www.careeronestop.org/competencymodel/competency-models/geospatial-technology.aspx

[2] http://www.aag.org/galleries/publications-files/GIST_Body_of_knowledge.pdf

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Regional / National Online Competitors	University Rank	2012 Completions	Credits	Cost Per Credit	Total Cost	Online?	Residency?	Time to Complete	Specializations	Notes
Pennsylvania State University - World Campus	37*	34	35	$ 784	$ 27,440	Yes	None	2 years		Ranking is for Penn State - University Park. Titled: Master of Geographic Information Systems
University of Southern California	23	4	28	$ 1,602	$ 44,856	Yes	One-week excursion	20 months	Three tracks: Spatial Data Acquisition and Integration, Spatial Data Analysis and Visualization, Spatial Application Development, Spatial Thinking	12-16 credit certificates also available
Johns Hopkins University	12	NA	30	$ 1,165	$ 34,950	Yes	None	2 years		10 courses; $3,495 per course. Five-course certificate also available.
Eastern Michigan University	77 (Midwest Region)	25	36	$ 580	$ 20,880	No	Yes	2 years		Titled: MS Geographic Information Systems (GIS). Professional certificate is online, but master's is on ground
Ohio University	135	12	40	$ 472	$ 18,880	No	Yes	2 years	Six: Environmental Geography, Geospatial Techniques, Development and Economic Geography, Physical Geography, Cultural/Historical Geography, Regional Specialization	Offers both MS and MA in Geography
Michigan State University	73	11	30	$ 646	$ 19,380	No	Yes	2 years		Titled: MS in Geography. Also awards certificate online, but MS is on ground.
Ohio State University	52	11	39	$ 772	$ 30,095	No	Yes	2 years		MA in GIS. Tuition assumes 3 credit courses
University of Cincinnati	135	10	35	$ 825	$ 28,910	No	Yes	2 years		
MEDIAN - Regional Programs		11	35	$ 778	$ 28,175					
Median - Online Programs		19	30	$ 1,165	$ 34,950					
Kent State University	201		32	$ 485	$ 15,520	No	Yes	2 years		

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Figure 1. Kent State University Competitive Program Analysis.

vii Describe the culminating academic experience (capstone experience), and how it will contribute to the enhancement of the student's professional preparation. Please provide a list of possible capstone experiences.

After completion of core requirements, concentration requirements, and electives, students will then enroll in the 6 hour Practicum. This course represents the culminating experience for students in the MGISc program. It will be taken in place of two Carousel/Specialist courses on the schedule for the student's final semester. Practicum is designed to provide practical experience in the application of MGISc course content in real-world professional settings. Students will select a professional project in consultation with their employer and program faculty and then will design, implement, and report on their activities in a culminating professional paper.

Possible capstone experiences include a student working with his/her employer to use GISc to solve an existing problem, such as data management, site selection, or spatially targeting an intervention. However, in organizations that are more moderate to minimal users of GISc, the student may work with his/her employer to identify a project that demonstrates how use of GISc can improve understanding of a problem or performance of an organizational activity. Finally, if the student is not already employed, the program Advisory Board will provide a project from one of their organizations where the student can engage in the types of activities previously identified.

b   N/A

3. **Need.** Examples of potential metrics of program need include:

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a   Student interest and demand; potential enrollment; ability to maintain the critical mass of students.

Based on the Department of Labor statistics (see p.7 & 8) GIS and geospatial technology in general is a rapidly growing field, the third fastest growing field in the nation. The Everspring Market Survey only confirmed this. It specifically examined student interest and demand and is presented below in Figure 2. Their overall conclusion was that this is a niche field that is growing rapidly and is attractive to individuals across the nation. Everspring projected that we will easily reach 100 students by 2018. More realistically, we will likely have to cap the program at 100 total students at any given time. It is based upon their analysis that the Office of Distance and Continuing Education, the Department of Geography, the College of Arts and Sciences and Everspring decided to partner on offering this program fully online.

Region	Impressions	Clicks	CTR	Leads	Conv. Rate	Cost Per Click	Cost Per Lead	Avg. Position
State	1,170	19	1.62%	2	10.5%	$ 8	$ 75	2.3
Region	4,723	32	0.68%	5	15.6%	$ 10	$ 61	2.4
Rest of U.S.	24,506	134	0.55%	14	10.4%	$ 6	$ 60	2.8
Total	**30,399**	**185**	**0.61%**	**21**	**11.4%**	**$ 7**	**$ 62**	**2.5**
All Programs Avg.	97,884	305	0.31%	28	9.2%	$ 16	$ 173	3.3

Summary Notes

- Attractive, growing online discipline
  - Below average impressions
- Low competition
  - Above average conversion and attractive cost per lead in test

Program Assessment Summary

Desirability	Viability	Feasibility
Y	G	G

2018 Enrollment Potential   100

14 On-Campus Enrollment

Figure 2. Desirability, Feasibility, and Viability of the Proposed Program based on Everspring Market Survey

b   Institutional need; plan for overall development of graduate programs at the proposing institutions.

The MGISc is one of several strategic priority online programs initiated by Everspring with Kent State University (Figure 3).

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everspring

Executive Summary

- Kent State University and Everspring are working together to consider a select set of Kent State programs; the intent of the research is to test the marketability of the programs delivered fully online
- The market test has informed on the competitiveness and the need for Kent State to differentiate; this exercise has proven to be very helpful in informing on the potential of these programs online and in refining the go-to-market approach
- The programs included in this test are as follows:
  - Bachelor of Business Administration
  - BS Fashion Merchandising
  - Ed.D
  - MA Communication Studies
  - MA Geography ← **Note: this was called and MA in Geography with specialization in GIS during the Market Analysis**
  - Master of Library and Information Science
  - Masters of Public Health
  - MS Computer Science
  - MS Education
  - MS Health Informatics

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Figure 3. Overview of Everspring-Kent State University Initial Online Program Priorities

c   Societal demand; intellectual development; advancement of the discipline; employment opportunities.

The need for the MGISc was determined based on the following sources: a) federal and state labor statistics; b) a market survey conducted by the company Everspring for Kent State University; and c) the responses to a questionnaire administered to Geography alumni. Though the need for training in Geographic Information Science (GISc) has consistently been growing over the past 20 years, the local and regional markets traditionally served by Kent State University represent a minute population in comparison to the need for this skillset in the national and global marketplace. Indeed, the Geospatial Technology industry has consistently been identified as a "High Growth" industry by the United States Department of Labor[3]. We propose a fully online Master of Geographic Information Science (MGISc) program which has been developed to meet this broader need through leveraging the existing strong GISc curriculum and faculty in the Department of Geography at Kent State University. The Department of Geography has a 20 year history of offering courses in Geographic Information Science at both the undergraduate (BA) and graduate (MA and PHD) levels but this Masters in Geographic Information Science is not replacing these current programs, nor is it being offered in connection with, or in response to, an initiative by a governmental entity. Our current BA has a GISc concentration and is part of the liberal education experience at Kent State; our MA is a research-focused degree with a thesis which has a concentration in GISc; our doctoral degree is

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[3] http://www.doleta.gov/brg/indprof/geospatial_profile.cfm

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the most advanced degree and students focusing in GISc typically are advancing knowledge about GISc. At the undergraduate level, students may also minor in GISc. The minor is targeted at non-Geography majors. In response to the national need, our Masters in Geographic Information Science is targeted at postgraduates, especially those professionals in business, industry and government who desire enhanced GISc knowledge to advance their current careers in a growing market or to prepare for new careers. The courses in the program are designed to work with a professional's busy schedule.

The MGISc will better prepare students to work in a variety of fields that use GISc, which is a main component of the Geospatial Technology industry and is used throughout many employment sectors. Tables 1 and 2 demonstrate the occupational outlooks for positions that commonly use GISc. Table 1 focuses on the three traditional areas that seek personnel with this specific skillset from the U.S. perspective and Table 2 includes this core, but also occupations that regularly make use of GISc for industry-specific applications. The need for GISc has moved well beyond geography and its allied fields. For example, a recent article in TechRepublic noted that, "As more manufacturers and marketers realize the advantages of building geographical data into their operations, GIS specialists - as well as managers and researchers with GIS insight - are becoming increasingly integral parts of their company teams."[4] Specifically, the skills obtained through this graduate program will prepare students to hold the following positions, all in sectors with positive job outlooks through 2022 according to the Bureau of Labor Statistics Occupational Outlook Handbook (http://www.bls.gov/ooh/):

Position	Job Outlook, 2012-2022
Geographers	29% (Much faster than national average)
Surveying and Mapping Technicians	14% (As fast as national average)
Cartographers and Photogrammetrists	20% (Faster than national average)

Table 1. U.S. Occupational Outlook for Traditional Positions related to the MGISc[5]

In Ohio, the job outlook for 2010-2020 for the same positions also shows high growth (Table 2).

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[4] Tech Republic. 2013. Where are the jobs in the GIS field? Available online: http://www.techrepublic.com/blog/career-management/where-are-the-jobs-in-the-gis-field/ Last accessed: 10/09/2014.
[5] http://www.bls.gov/ooh/

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Code	Position	Job Outlook, 2010-2020
11-0000	**Management Occupations**	**2.8%**
11-2021	Marketing Managers	8.8%
11-3021	Computer & Information Systems Managers	14.6%
11-3071	Transportation, Storage, & Distribution Managers	9.0%
11-9121	Natural Sciences Managers	6.4%
11-9161	Emergency Management Directors	10.3%
13-0000	**Business & Financial Operations Occupations**	**12.3%**
13-1161	Market Research Analysts & Marketing Specialists	34.7%
13-2021	Appraisers & Assessors of Real Estate	2.2%
15-0000	**Computer & Mathematical Occupations**	**18.1%**
15-1111	Computer & Information Research Scientists	19.4%
15-1121	Computer Systems Analysts	21.5%
15-1131	Computer Programmers	4.8%
15-1132	Software Developers, Applications	24.6%
15-1133	Software Developers, Systems Software	28.8%
15-1141	Database Administrators	26.6%
15-1179	Information Security Analysts, Web Developers, & Computer Network Architects	15.7%
17-0000	**Architecture and Engineering Occupations**	**5.7%**
17-1012	Landscape Architects	10.0%
17-1021	Cartographers and Photogrammetrists	19.0%
17-1022	Surveyors	16.7%
17-3031	Surveying and Mapping Technicians	10.4%
17-2081	Environmental Engineers	14.0%
19-0000	**Life, Physical, & Social Science Occupations**	**9.8%**
19-1013	Soil & Plant Scientists	6.3%
19-1023	Zoologists & Wildlife Biologists	3.4%
19-1029	Biological Scientists, All Other	2.0%
19-1031	Conservation Scientists	0.0%
19-1032	Foresters	0.0%
19-1042	Medical Scientists, Ex Epidemiologists	31.1%
19-2021	Atmospheric & Space Scientists	5.6%
19-2042	Geoscientists, Ex. Hydrologists & Geographers	29.0%
19-3091	Anthropologists & Archaeologists	15.4%
19-4091	Environmental Science & Protection Tech, Including Health	16.3%
41-0000	**Sales & Related Occupations**	**6.1%**
41-3021	Insurance Sales Agents	17.0%
41-9021	Real Estate Brokers	1.3%
41-9022	Real Estate Sales Agents	7.7%

Table 2. Ohio Occupational Outlook for All Positions related to the MGISc[6]

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[6] http://ohiolmi.com/proj/OhioJobOutlook.htm

d   Scope; local, regional and national needs; international need.

In addition to the general labor market statistics at both a national and state level, Everspring[7] conducted a market survey in July 2014 that specifically focused on a potential Kent State University, Department of Geography, fully online GISc graduate degree. Results of this study indicate that the degree is desirable, viable, and feasible for the marketplace and is desirable nationally (Figure 2). In addition, our degree is different both in focus and delivery to current Geography and GIS degrees in Ohio. In terms of focus, we will be the only applied professional graduate GIS degree offered in the state. In addition, our focus on GIS and Health, as well as CyberGIS, reflects our faculty expertise and is a unique niche in the State of Ohio. In terms of delivery, we will be the only online GIS program in the state, and only the fourth program to go fully online in the nation. From this standpoint, we do not see ourselves in competition with other programs in Ohio, or even the nation, but rather we offer new opportunities to potential students that currently do not exist. Our potential applicants are trained professionals who have no desire to go to school full-time to obtain a degree; rather they need to be able to take courses in tandem with their own busy schedule. This online program will allow them to do this.

4.   **Access and Retention of Underrepresented Groups**

a   Plan to ensure recruitment, retention and graduation of underrepresented groups within the discipline.

The department of Geography has been cognizant of recruiting underrepresented students into the discipline. However, our standard methods such as high school outreach, targeted recruitment via Hobsons web-based Constituent Relationship Management (CRM) system and targeted recruitment via our national meetings will be ineffective in this program as we are outreaching to a non-traditional population. We are working with the company Everspring who is developing our market plan. They will leverage the marketing channels that exist today within Kent State (websites, social properties, and alumni communications, to provide a few examples) and develop additional materials for outreach via paid internet search, direct mail and direct email. In general, we will both develop a program-specific digital marketing plan that uses a variety of techniques to conduct targeted outreach to qualified potential populations, including underrepresented minorities. We will also continue to advertise this program through the same venues as our BA, MA and PHD degrees, but in addition we will outreach to national organizations such as the Black Business Professional Network and the Latino Business Association. Once in the program, all students will be the subject of intense one-on-one advising to help them succeed in the program.

b   Provide as background a general assessment of:
i   Institution and departmental profiles of total enrollment and graduate student enrollment of underrepresented groups within the discipline.

The following institutional and departmental enrollment numbers are provided by Kent State RPIE (Research, Planning and Institutional Effectiveness). The Department of Geography has currently lower percentages in AALANA and female students than the University norm, and

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[7] http://www.everspringpartners.com/

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slightly higher percentages in foreign students. While these numbers appear disproportionate, they are more representative of STEM disciplines as a whole, and more representative of Geography as a discipline. We have also made a concerted effort to recruit more minority and foreign students in the last two years hence the disproportionate percentages between degrees awarded and students currently enrolled.

Fall 2014 enrollment	Master's		Specialist (Ed.S.)		Doctoral (Ph.D.)		Professional (D.P.M., D.N.P., Au.D.)		All Graduate Level	
Current Enrollment	**4031**		**40**		**1297**		**504**		**5872**	
White, non-Hispanic	2728	67.7%	33	82.5%	757	58.4%	302	59.9%	3820	65.1%
Non-white and Hispanic, aggregated	422	10.5%	4	10.0%	122	9.4%	104	20.6%	652	11.1%
Black or African-American	207	5.1%	3	7.5%	53	4.1%	32	6.3%	295	5.0%
Hispanic or Latino	86	2.1%	0	0.0%	22	1.7%	14	2.8%	122	2.1%
Asian, Native Hawaiian, or other Pacific Islander	48	1.2%	1	2.5%	32	2.5%	55	10.9%	136	2.3%
Asian	46	1.1%	1	2.5%	31	2.4%	54	10.7%	132	2.2%
Native Hawaiian or other Pacific Islander	2	0.0%	0	0.0%	1	0.1%	1	0.2%	4	0.1%
American Indian or Alaska Native	12	0.3%	0	0.0%	2	0.2%	2	0.4%	16	0.3%
Other or Multiple Races	69	1.7%	0	0.0%	13	1.0%	1	0.2%	83	1.4%
International, non-U.S. resident	611	15.2%	0	0.0%	389	30.0%	12	2.4%	1012	17.2%
Ethnicity unspecified or unknown	270	6.7%	3	7.5%	29	2.2%	86	17.1%	388	6.6%
AALANA	359	8.9%	3	7.5%	85	6.6%	48	9.5%	495	8.4%
Female	2662	66.0%	35	87.5%	722	55.7%	215	42.7%	3634	61.9%
Male	1369	34.0%	5	12.5%	575	44.3%	289	57.3%	2238	38.1%

	Master's		Specialist (Ed.S.)		Doctoral (Ph.D.)		Professional (D.P.M., D.N.P., Au.D.)		All Graduate Level	
Current Enrollment in Geography	**17**		**0**		**25**		**0**		**42**	
White, non-Hispanic	12	70.6%			17	68.0%			29	69.0%
Non-white and Hispanic, aggregated	1	5.9%			1	4.0%			2	4.8%
Black or African-American	0	0.0%			0	0.0%			0	0.0%
Hispanic or Latino	0	0.0%			1	4.0%			1	2.4%
Asian, Native Hawaiian, or other Pacific Islander	0	0.0%			0	0.0%			0	0.0%
Asian	0	0.0%			0	0.0%			0	0.0%
Native Hawaiian or other Pacific Islander	0	0.0%			0	0.0%			0	0.0%
American Indian or Alaska Native	0	0.0%			0	0.0%			0	0.0%
Other or Multiple Races	1	5.9%			0	0.0%			1	2.4%
International, non-U.S. resident	4	23.5%			6	24.0%			10	23.8%
Ethnicity unspecified or unknown	0	0.0%			1	4.0%			1	2.4%
AALANA	1	5.9%			1	4.0%			2	4.8%
Female	5	29.4%			8	32.0%			13	31.0%
Male	12	70.6%			17	68.0%			29	69.0%

Table 3A and B. A. Kent State University 2014 Graduate Enrollment, including AALANA and gender breakdown. B. The Department of Geography 2014 Graduate Enrollment.

The following numbers on graduate degrees awarded are provided by Kent State RPIE (Research, Planning and Institutional Effectiveness) and are for the last academic year only. The Department of Geography awarded no degrees to AALANA students in the last year. 36.4% were to women.

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AY 2014 (Sum 2013, Fall 2013, Spring 2014)	Master's		Specialist (Ed.S.)		Doctoral (Ph.D.)		Professional (D.P.M., D.N.P., Au.D.)		All Graduate Level	
Total Degrees Awarded	1555		28		145		114		1842	
White, non-Hispanic	1173	75.4%	23	82.1%	84	57.9%	61	53.5%	1341	72.8%
Non-white and Hispanic, aggregated	134	8.6%	2	7.1%	12	8.3%	16	14.0%	164	8.9%
Black or African-American	75	4.8%	1	3.6%	4	2.8%	0	0.0%	80	4.3%
Hispanic or Latino	24	1.5%	0	0.0%	1	0.7%	3	2.6%	28	1.5%
Asian, Native Hawaiian, or other Pacific Islander	21	1.4%	1	3.6%	7	4.8%	11	9.6%	40	2.2%
Asian	21	1.4%	1	3.6%	7	4.8%	11	9.6%	40	2.2%
Native Hawaiian or other Pacific Islander	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
American Indian or Alaska Native	1	0.1%	0	0.0%	0	0.0%	2	1.8%	3	0.2%
Other or Multiple Races	13	0.8%	0	0.0%	0	0.0%	0	0.0%	13	0.7%
International, non-U.S. resident	189	12.2%	1	3.6%	44	30.3%	2	1.8%	236	12.8%
Ethnicity unspecified or unknown	59	3.8%	2	7.1%	5	3.4%	35	30.7%	101	5.5%
AALANA	110	7.1%	1	3.6%	5	3.4%	5	4.4%	121	6.6%
Female	1048	67.4%	24	85.7%	78	53.8%	43	37.7%	1193	64.8%
Male	507	32.6%	4	14.3%	67	46.2%	71	62.3%	649	35.2%

	Master's		Specialist (Ed.S.)		Doctoral (Ph.D.)		Professional (D.P.M., D.N.P., Au.D.)		All Graduate Level	
Total Degrees Awarded in Geography	9		0		2		0		11	
White, non-Hispanic	9	100.0%			2	100.0%			11	100.0%
Non-white and Hispanic, aggregated	0	0.0%			0	0.0%			0	0.0%
Black or African-American	0	0.0%			0	0.0%			0	0.0%
Hispanic or Latino	0	0.0%			0	0.0%			0	0.0%
Asian, Native Hawaiian, or other Pacific Islander	0	0.0%			0	0.0%			0	0.0%
Asian	0	0.0%			0	0.0%			0	0.0%
Native Hawaiian or other Pacific Islander	0	0.0%			0	0.0%			0	0.0%
American Indian or Alaska Native	0	0.0%			0	0.0%			0	0.0%
Other or Multiple Races	0	0.0%			0	0.0%			0	0.0%
International, non-U.S. resident	0	0.0%			0	0.0%			0	0.0%
Ethnicity unspecified or unknown	0	0.0%			0	0.0%			0	0.0%
AALANA	0	0.0%			0	0.0%			0	0.0%
Female	3	33.3%			1	50.0%			4	36.4%
Male	6	66.7%			1	50.0%			7	63.6%

Table 4A and B. A. Kent State University 2013 degree conferrals, including AALANA and gender breakdown. B. The Department of Geography 203 degree conferrals.

ii   Compare underrepresented groups degree recipients from the department and university at all levels compared to national norms. Supply data by group where available.

The following tables show the national norms for degree recipients across the country within the discipline of geography. Please note that we are comparing different years but the patterns are indicative of the total situation. Kent State Geography graduated no AALANA or other ethnic minorities in the last year. Note that this is not the norm, even though our overall numbers are still lower than the national norm.

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	All U.S. graduate degree-granting		Institutions of participants in 2010 AAG		Departments participating in 2010 AAG	
	institutions, 2009 $N = 1,960$		department survey $n = 43$		department survey $n = 43$	
Groups	**Mean %**	**Median %**	**Mean %**	**Median %**	**Mean %**	**Median %**
White, non-Hispanic	67.58	72.70	68.01	71.79	79.62	82.89
Non-white and Hispanic, aggregated	22.11	18.66	16.81	13.00	14.63	11.88
Black or African American	12.89	6.03	6.48	4.97	3.82	1.39
Hispanic or Latino	5.63	2.94	4.81	3.08	2.80	0.69
Asian, Native Hawaiian, or other Pacific Islander	5.48	2.67	4.55	3.18	4.69	1.86
American Indian or Alaska Native	0.73	0.29	0.65	0.48	0.79	0.00
Other or multiple races	0.27	0.00	0.31	0.00	2.08	0.00
International, non-U.S. resident	7.42	2.78	15.18	12.97	5.74	0.00
Ethnicity unspecified or unknown (as percentage of total enrollment)	11.38		6.41		0.00	
Female	59.17	61.36	56.89	56.29	43.57	43.20

Note: AAG = Association of American Geographers. *Sources*: AAG Survey of Geography Departments (2010); U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS; 2010).

Table 5. Average Graduate Enrollments by Race/Ethnicity and Gender for the Discipline of Geography at United States Institutions[8]

Groups	National Averages of degrees conferred in Geography (2010 data)	Degrees conferred in Geography at Kent State (2013 data)
White, non-hispanic	76.92%	100%
Non-white and Hispanic aggregated	14.63%	0%
Female	43.57%	36.4%

Table 6: Average % of degrees awarded by Race/Ethnicity and Gender for the Discipline: National versus Department of Geography at Kent State University.

5. **Statewide Alternatives**

 a   Programs available in other institutions.
There are several residential programs in Geography and GIS in Ohio (Table 7). However, our proposed MGISc degree is different both in focus and delivery to current Geography and GIS degrees in Ohio. In terms of focus, we will be the only applied professional graduate GIS degree offered in the state. In addition, our focus on GIS and Health, as well as CyberGIS, reflects our faculty expertise and is a unique niche in the State of Ohio. In terms of delivery, we will be the only online GIS program in the state, and only the fourth program to go fully online in the nation. From this standpoint, we do not see ourselves in competition with other programs in Ohio, or even the nation, but rather we offer new opportunities to professionals who are unlikely to enter a residential program while working full-time.

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[8] Adams, J.K., Solis, P., and McKendry, J. 2014. The Landscape of Diversity in U.S. Higher Education Geography. *Professional Geographer* 66(2): 183-194.

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Institution	Program	Type
Bowling Green State University	Master of Science in Applied Geospatial Science; Geospatial Technology Graduate Certificate	Residential
Miami University	Certificate; M.A. in Geography	Residential
Ohio University	Certificate; M.A., M.S. in Geography	Residential
The Ohio State University	M.A., Ph.D. in Geography	Residential
University of Akron	Certificate; M.S in Geography	Residential
University of Cincinnati	M.A., Ph.D.; GIS Certificate Program	Residential
University of Dayton	Certificate	Residential
University of Toledo	Certificate	Residential

Table 7. Geography Graduate Programs in Ohio

b   Appropriateness of specific locale for the program.
As this program is fully online, the specific locale is not particularly important as we are reaching out to both a state and national audience. The specific expertise provided by the GISc faculty in the Department of Geography at Kent State University makes the Kent State program unique.

c   Opportunities for inter-institutional collaboration.
As this program is fully online, it can leverage the GISc experts throughout Ohio both in industry and at other universities by inviting them to serve as instructors of courses in their areas of expertise. While we are not proposing this initially, there is room for growth. All new courses, however, would be developed in collaboration with our Office of Continuing and Distance Education, and all would have to be Quality Matters certified prior to going live.

d   Institutional Priority and Costs

   i   Support and commitment of the proposing institution's central administration.
   • Online learning is an institutional priority at Kent State. The creation of new fully online degrees is of the highest priority and our program has been chosen as one that will be marketed via the company Everspring, a professional company dedicated to marketing and delivering DL programs. Everspring is under contract with Kent State University;
   • All of our courses are being redesigned for online delivery in collaboration with the Office of Continuing and Distance Education. Each course undergoes a semester long transition which is a one-on-one collaboration with a course designer and instructor. This is entirely financially supported by the Central Administration;
   • The College of Arts and Sciences made a significant investment in purchasing a state-of-the-art computing cluster consisting of 386 computing cores, almost 1.5 terabytes (or 1,500 gigabytes) of memory, and more than 30 terabytes (or 30,000 gigabytes) of total disk space to support parallel and high-performance computing, which is available to be utilized by students in the CyberGIS concentration;
   • Our last two faculty hires in Geography were partially in support of this program;
   • We have a dedicated technical support line in Geography;
   • The College of Arts and Sciences has approved us to hire an academic program coordinator / manager.

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ii   Adequacy of available resources committed for the initiation of the program.

- There are eight Geography faculty with specific expertise who will offer courses in this program. We are also utilizing courses from other disciplines as electives.
- We are working with a team of course developers from the Office of Continuing and Distance Education
- Blackboard will be utilized as the course delivery mechanism
- We have full access to suite of course development tools
- We are working with Everspring to market the program
- We have servers and computing clusters of servers to support processing spatial big data and web-based GIS courses, which currently are provided by the College of Arts and Sciences.
- We are utilizing a virtual machine (VM) model. Our servers are sufficient to support the number of VMs for simultaneous access by students in the program. By using the VM model, we will fully replicate our current computer lab PC configurations providing online students with the same access as our face-to-face students. This is important, as students will not need to worry about installing and managing complex GIS software on their own machines; they will simply log in to a VM and have access to everything. We are currently licensed in ArcGIS, ENVI, Idrisi, ERDAS, Microsoft Office and a plethora of other software packages.

6. **External Support**

   a   Community, foundation, governmental and other resources.

   Letters of support for this program are being provided by:

   Joe Reichlin: GIS officer, Portage County Officer of Information Technology (representing Local Government)

   Brian Kelley, Chief Information Officer, Portage County, Ohio (representing Local Government)

   Brian George: Ohio Department of Natural Resources (representing State Government)

   Mike Binkley: Manager of Technology Development, Davey Tree Company (representing private industry)

   David DiBiase: Team Lead – Education and Industry ESRI (representing private industry)

   Doug Richardson: Executive Director, the Association of American Geographers (representing the academic discipline of Geography)

   Lisa Petit: Chief of Science and Resources Management, Cuyahoga Valley National Park Federal Government (representing Federal Government)

New Program Needs Analysis and Faculty Credentials

All Kent State academic units are required to provide evidence of the need for a proposed academic program. Generic statements that imply the "need" for the program are not sufficient. Proposals should include data-driven market research that addresses a student demand that will increase enrollment, potential for employment upon graduation, competitive advantage for the university, reasonable non-duplication with other programs and appropriate multi-year financial analyses.

The following needs analysis is for both the fully online Certificate in Geographic Information Science (C-GISc) and the fully online Masters in Geographic Information Science (MGISc).

1. ESTABLISH A NEED FOR THE PROPOSED PROGRAM

Address the need and rationale for the establishment of the program. The description should include an assessment of workforce demand as well as occupational titles and employment opportunities. Appropriate needs assessment document must include data obtained from the State of Ohio Labor Market Statistics and/or the U.S. Department of Labor Bureau of Labor Statistics and surveys of local/regional employers. Survey documentation should include:

a. The survey instrument

b. Target population

c. Description of sample

d. Number and name of businesses involved in the sample

Everspring[1] conducted a market survey in July 2014 that specifically focused on a potential Kent State University, Department of Geography, fully online GISc graduate degree. Figure 1 presents an overview of the methodology, while Figure 2 reports on results that indicate that the degree is desirable, viable, and feasible for the marketplace.

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[1] http://www.everspringpartners.com/

everspring

Methodology for most recent research

<u>Google test details</u>

Run time: July 2-30, 2014 (29 total days)

Total spent: $39,000

Geographic reach: Three campaign segments to differentiate response rates between Ohio, the region and the rest of the U.S.

<u>Glossary of terms</u>

Impressions: Total number of times prospective students viewed a Kent State Paid Search ad during the test. Measures raw potential demand when viewed in context of average ad position.

Clicks: Total number of times the ad(s) were clicked on by prospective students. Measures active potential program interest and also ad effectiveness.

Click-through Rate: % of viewers of the ad that clicked on the ad.

Leads: Total number of form submissions on the Kent State landing page. Measures prospective student behavioral intent.

Conversion Rate: % of click-throughs that converted to a lead.

CPC / Cost Per Lead: Expresses clicks and leads in terms of the dollar amount of advertising spend required to generate one click/lead.

Average position: The average position of the ads for the program (higher position = more visibility). Position averages approaching 1.0 suggest maximized cost/demand.

Figure 1. Methodology of Everspring Market Survey

everspring

MA Geography

MA Geography

Region	Impressions	Clicks	CTR	Leads	Conv. Rate	Cost Per Click		Cost Per Lead	Avg. Position
State	1,170	19	1.62%	2	10.5%	$	8	$ 75	2.3
Region	4,723	32	0.68%	5	15.6%	$	10	$ 63	2.4
Rest of U.S.	24,506	134	0.55%	14	10.4%	$	6	$ 60	2.6
Total	**30,399**	**185**	**0.61%**	**21**	**11.4%**	**$**	**7**	**$ 62**	**2.5**
All Programs Avg.	57,684	205	0.31%	28	9.2%	$	16	$ 171	3.3

Summary Notes

Attractive, growing online discipline

- Below average impressions

Low competition

- Above average conversion and attractive cost per lead in test

Program Assessment Summary

Desirability	Viability	Feasibility
Y	G	G

2018 Enrollment Potential | 100 |

14 On-Campus Enrollment

Figure 2. Results of Everspring Market Survey

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e. Employment opportunities by job titles including:

   i. Number of job openings (due to growth)

   ii. Salary for these employees

Tables 1 and 2 demonstrate the occupational outlooks for positions that commonly use GISc. Table 1 focuses on the three traditional areas that seek personnel with this specific skillset from the U.S. perspective and Table 2 includes this core, but also occupations that regularly make use of GISc for industry-specific applications. The need for GISc has moved well beyond geography and its allied fields. For example, a recent article in TechRepublic noted that, "As more manufacturers and marketers realize the advantages of building geographical data into their operations, GIS specialists - as well as managers and researchers with GIS insight - are becoming increasingly integral parts of their company teams."[2] Specifically, the skills obtained through this graduate program will prepare students to hold the following positions, all in sectors with positive job outlooks through 2022 according to the Bureau of Labor Statistics Occupational Outlook Handbook (http://www.bls.gov/ooh/):

Position	Job Outlook, 2012-2022
Geographers	29% (Much faster than national average)
Surveying and Mapping Technicians	14% (As fast as national average)
Cartographers and Photogrammetrists	20% (Faster than national average)

Table 1. U.S. Occupational Outlook for Traditional Positions related to GISc[3]

In Ohio, the job outlook for 2010-2020 for the same positions also shows high growth (Table 2).

Code	Position	Job Outlook, 2010-2020
11-0000	Management Occupations	2.8%
11-2021	Marketing Managers	8.8%
11-3021	Computer & Information Systems Managers	14.6%
11-3071	Transportation, Storage, & Distribution Managers	9.0%
11-9121	Natural Sciences Managers	6.4%
11-9161	Emergency Management Directors	10.3%
13-0000	Business & Financial Operations Occupations	12.3%
13-1161	Market Research Analysts & Marketing Specialists	34.7%

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[2] Tech Republic. 2013. Where are the jobs in the GIS field? Available online: http://www.techrepublic.com/blog/career-management/where-are-the-jobs-in-the-gis-field/ Last accessed: 10/09/2014.

[3] http://www.bls.gov/ooh/

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13-2021	Appraisers & Assessors of Real Estate	2.2%
15-0000	**Computer & Mathematical Occupations**	**18.1%**
15-1111	Computer & Information Research Scientists	19.4%
15-1121	Computer Systems Analysts	21.5%
15-1131	Computer Programmers	4.8%
15-1132	Software Developers, Applications	24.6%
15-1133	Software Developers, Systems Software	28.8%
15-1141	Database Administrators	26.6%
15-1179	Information Security Analysts, Web Developers, & Computer Network Architects	15.7%
17-0000	**Architecture and Engineering Occupations**	**5.7%**
17-1012	Landscape Architects	10.0%
17-1021	Cartographers and Photogrammetrists	19.0%
17-1022	Surveyors	16.7%
17-3031	Surveying and Mapping Technicians	10.4%
17-2081	Environmental Engineers	14.0%
19-0000	**Life, Physical, & Social Science Occupations**	**9.8%**
19-1013	Soil & Plant Scientists	6.3%
19-1023	Zoologists & Wildlife Biologists	3.4%
19-1029	Biological Scientists, All Other	2.0%
19-1031	Conservation Scientists	0.0%
19-1032	Foresters	0.0%
19-1042	Medical Scientists, Ex Epidemiologists	31.1%
19-2021	Atmospheric & Space Scientists	5.6%
19-2042	Geoscientists, Ex. Hydrologists & Geographers	29.0%
19-3091	Anthropologists & Archaeologists	15.4%
19-4091	Environmental Science & Protection Tech, Including Health	16.3%
41-0000	**Sales & Related Occupations**	**6.1%**
41-3021	Insurance Sales Agents	17.0%
41-9021	Real Estate Brokers	1.3%
41-9022	Real Estate Sales Agents	7.7%

Table 2. Ohio Occupational Outlook for All Positions related to GISc[4]

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[4] http://ohiolmi.com/proj/OhioJobOutlook.htm

In addition to the positive job outlook for students who complete these GISc programs, the potential salaries for which they would be qualified for range from $19.19 through to $59.78 as of May 2011 in Ohio and from $19.07 to $58.15 for the U.S. as a whole (Table 3).

Code	Position	Average Wage, May 2011 (Ohio)	Median Pay, 2012 (US)
11-0000	**Management Occupations**		
11-2021	Marketing Managers	$59.78	$55.65
11-3021	Computer & Information Systems Managers	$55.41	$58.15
11-3071	Transportation, Storage, & Distribution Managers	$44.17	$34.99 (logisticians)
11-9121	Natural Sciences Managers	$56.39	$55.64
11-9161	Emergency Management Directors	$27.42	$28.73
13-0000	**Business & Financial Operations Occupations**		
13-1161	Market Research Analysts & Marketing Specialists	$29.43	$28.99
13-2021	Appraisers & Assessors of Real Estate	$22.44	$23.82
15-0000	**Computer & Mathematical Occupations**		
15-1111	Computer & Information Research Scientists	$48.60	$49.13
15-1121	Computer Systems Analysts	$37.86	$38.31
15-1131	Computer Programmers	$32.38	$35.71
15-1132	Software Developers, Applications	$38.51	$44.88
15-1133	Software Developers, Systems Software	$40.85	$44.88
15-1141	Database Administrators	$35.08	$37.06
15-1179	Information Security Analysts, Web Developers, & Computer Network Architects	$36.37	$41.43; $30.05; $43.75
17-0000	**Architecture and Engineering Occupations**		
17-1012	Landscape Architects	$28.47	$30.86
17-1021	Cartographers and Photogrammetrists	$28.69	$27.62
17-1022	Surveyors	$26.90	$27.04
17-2081	Environmental Engineers	$41.95	$38.89
17-3031	Surveying and Mapping Technicians	$19.38	$19.07
19-0000	**Life, Physical, & Social Science Occupations**		
19-1013	Soil & Plant Scientists	$26.90	$28.18
19-1023	Zoologists & Wildlife Biologists	$26.11	$27.74
19-1029	Biological Scientists, All Other	$34.65	$27.74
19-1031	Conservation Scientists	$29.76	$28.40
19-1032	Foresters	$24.42	$28.40
19-1042	Medical Scientists, Ex Epidemiologists	$32.22	$37.01
19-2021	Atmospheric & Space Scientists	$34.00	$42.91

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19-2042	Geoscientists, Ex. Hydrologists & Geographers	$33.55	$43.70
19-3091	Anthropologists & Archaeologists	$28.16	$27.61
19-4091	Environmental Science & Protection Tech, Including Health	$19.19	$30.56
41-0000	**Sales & Related Occupations**		
41-3021	Insurance Sales Agents	$29.38	$23.15
41-9021	Real Estate Brokers	$43.40	$20.19
41-9022	Real Estate Sales Agents	$21.37	$20.19

Table 3. Representative Wages for GISc-Related Employment

Other evidence may include, but is not limited to:

- Letters of support from businesses, schools and other organizations that commit to multi-year partnerships for education and training. The commitment may include financial support, "guaranteed" enrollments and other relevant proof of interest;

Letters of support for this program are being provided by:

Mike Binkley: Manager of Technology Development, Davey Tree Company (representing private industry)

David DiBiase: Team Lead – Education and Industry ESRI (representing private industry)

Brian George: Ohio Department of Natural Resources (representing State Government)

Brian Kelley, Chief Information Officer, Portage County, Ohio (representing Local Government)

Candida Mannozzi: Education and Outreach Officer, the Association of American Geographers (representing the academic discipline of Geography)

Lisa Petit: Chief of Science and Resources Management, Cuyahoga Valley National Park Federal Government (representing Federal Government)

Joe Reichlin: GIS Manager, Portage County Office of Information Technology (representing Local Government)

2. PROJECTED STUDENT AND GRADUATE DATA

Provide an explanation of potential and identified sources of students for the program. Documentation should demonstrate sufficient student interest to support the program and may include surveys of current students and related program majors, secondary students, as well as

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employees seeking advanced training. The data should include projected student enrollment and a projection of the number of graduates for the first five years of the program. Present projected enrollments in a table showing how many students will attend full-time and how many part-time.

For **master's degree** proposals, the number of declared undergraduate majors and the degree production over the preceding three years for the corresponding baccalaureate program, if there is one.

For **bachelor's and master's degree** programs, list the professional uses of the proposed degree programs.

Please see Tables 1 – 3 for professional uses of the C-GISc and MGISc. Furthermore, the Everspring Market Study has identified the following target student profiles and justifications for enrollment in these programs (Figure 3).
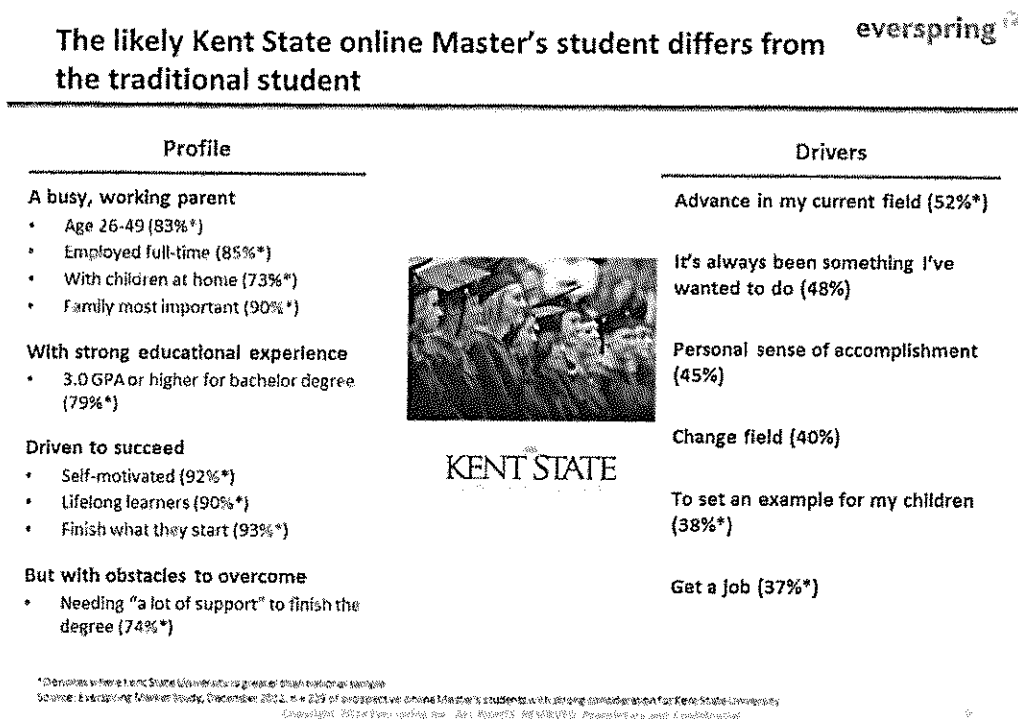
The likely Kent State online Master's student differs from the traditional student   *everspring*

Profile	Drivers

A busy, working parent
- Age 26-49 (83%*)
- Employed full-time (85%*)
- With children at home (73%*)
- Family most important (90%*)

With strong educational experience
- 3.0 GPA or higher for bachelor degree (79%*)

Driven to succeed
- Self-motivated (92%*)
- Lifelong learners (90%*)
- Finish what they start (93%*)

But with obstacles to overcome
- Needing "a lot of support" to finish the degree (74%*)

KENT STATE

Advance in my current field (52%*)

It's always been something I've wanted to do (48%)

Personal sense of accomplishment (45%)

Change field (40%)

To set an example for my children (38%*)

Get a Job (37%*)

Figure 3. Prospective Student Profile

3. COMMUNICATION WITH BUSINESS AND INDUSTRY

Surveys/focus groups (with a valid number of responses/participants) should be conducted with local businesses, advisory/planning committees and other workforce

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training sources. Provide a list of potential employers, locally, state-wide and regionally, appropriate.

The MGISc and C-GISc will have an Advisory Board made up of the following personnel:

- David DiBiase: Team Lead – Education and Industry ESRI
- Brian George: Ohio Department of Natural Resources
- Brian Kelley, Chief Information Officer, Portage County, Ohio
- Candida Mannozzi: Education and Outreach Officer, the Association of American Geographers
- Lisa Petit: Chief of Science and Resources Management, Cuyahoga Valley National Park
- Joe Reichlin: GIS Manager, Portage County Office of Information Technology

Potential employers include local, state, and federal government, as well as private industry as represented in the Advisory Board and in Tables 1 – 3 above.

4. FACULTY CREDENTIALS AND CAPACITY

<u>Faculty Credentials</u>

All program faculty meet the required credentials. Their vitas are included in this submission:

- Andrew Curtis, Ph.D. (State University of New York, Buffalo, 1995)
- Jacqueline W. Curtis, Ph.D. (Louisiana State University, 2005)
- Jennifer Mapes, Ph.D. (University of Southern California, 2009)
- Jay Lee, Ph.D. (University of Western Ontario, 1989)
- Mandy Munro-Stasiuk, Ph.D (University of Alberta, 1999)
- Eric Shook, Ph.D. (University of Illinois at Urbana, 2013)
- Emariana Widner, Ph.D. (Texas State University, San Marcos, 2009)
- Xinyue Ye, Ph.D. (San Diego State University – University of California, Santa Barbara, 2010)

The following expectations apply to all full-time and part-time instructors, including graduate teaching assistants:

- Faculty members hold a degree from a regionally or nationally accredited institution recognized by the U.S. Department of Education or the Council for Higher Education Accreditation or equivalent as verified by a member of the National Association of Credential Evaluation Services Inc.

- Faculty members hold a terminal degree or a degree at least one level above the degree level in which they are teaching.

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o   At least a bachelor's degree if teaching in an associate degree program.

o   At least a master's degree if teaching in a bachelor's degree program.

o   A terminal degree if teaching in a graduate program.

- Faculty members teaching general education courses hold a master's degree or higher in the discipline.

- In addition to meeting degree level requirements, faculty members teaching technically- or practice-oriented courses demonstrate evidence of practical experience in the field and applicable licenses and/or certifications.

- For programs involving clinical faculty (e.g., student teaching supervisors, clinical practicum supervisors), the credentials and involvement of clinical faculty are described and meet applicable professional standards for the delivery of the educational experiences.

- Where professional accreditation standards for faculty members exceed the Chancellor's standards, faculty members are expected to meet the professional accreditation standards.

- Faculty members show evidence of professional development in the discipline.

- Faculty members who received their degrees from the institution do not constitute the majority of the program's faculty.

Faculty Capacity

Program faculty and program design meet the requirements of capacity as outlined below.

- Faculty resources are sufficient to meet the teaching, scholarship, service and advising needs of the program and the expectations of the institution.

- Each program is led by a full-time faculty member.

- Full-time faculty members are involved at each location where more than 50 percent of an academic program can be completed (e.g., main campus, regional campus, additional locations)

- Individuals who are full-time employees of the institution teach a minimum of 60 percent of the program curriculum. Portions of the program that are taught by individuals who are not employees of the institution (e.g., internships, clinical practicum experiences, field experiences and student teaching) are not included in the calculations for this standard.

- At least one full-time faculty member is required for every 30 full-time equivalent students in an undergraduate degree program.

- Faculty members reflect the racial, ethnic and gender diversity of the community and the student body.

- Students interact with several faculty members within the program to encourage exposure to a diversity of experiences and perspectives.

Exceptions may be reviewed on a case-by-case basis.

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To: The Ohio Board of Regents
Re: Submission of the full proposal of Master of Geographic Information Science and response to reviewers' comments on PDP

We are thrilled that the reviews of our proposal development plan were generally positive and that all responses were in agreement that Geographic Information Science is a high growth area with increasing demand for GIS across the nation. We thank the reviewers for their comments and now submit the full proposal. We offer some clarifications on the degree below, including changes we have chosen to make, where there is no appropriate placeholder in the full proposal and we also note below how we have incorporated specific suggestions to make what we believe is a very strong program that will have national appeal.

Clarifications

- We changed the proposed degree type to a Master of Geographic Information Science (instead of Masters of Science in Geographic Information Science) as it better reflects the nature the degree we propose to offer. That is, the degree is tailored towards a professional audience, one that will likely already have experience in digital science, health geography or public health, and environmental science. This is therefore a terminal degree (not recommended for students who wish to eventually pursue the PhD). This degree is the first professional degree in Ohio in GIS. It is also only the 4th program in the nation to be fully online (after Pennsylvania State University, University of South California, and Johns Hopkins University). The program delivery format will be fully online and asynchronous, meaning that students will not be required to sign in and participate at specific times, though there will be time windows for all activities. This allows the maximum flexibility possible to fit in with a professionals busy work schedule. All courses will be Quality Matters certified (assures quality in delivery, and quality professional development for faculty teaching the courses). We are very excited to be on the leading edge of online program development in GIS.
- All courses (other than practicum) are designed to be offered in 7 week segments, and as such, the entire degree can be completed in 5 semesters by taking one course at a time. We have arranged the offerings in such a way that a student may opt to not enroll during one 7 week window, but can re-enter in the following 7 week window.
- We eliminated the thesis option presented in the PDP. We originally proposed a choice between a non-thesis (practicum) and thesis (research) option. Some reviewers found this confusing and we, in retrospect, agree. What we were proposing was overly complex.   In streamlining our changes, and aligning the requirements with the MGISc, we opted to eliminate the thesis option to allow us to focus on the professional aspects of the degree.
- We reduced the number of concentrations from four to three to better represent our geospatial expertise in CyberGIS, applied health geography, and applied environmental geography.
- As well as the common core of the degree, each concentration has three required courses, and 2 elective courses. Three required courses will allow the students to better specialize in their area of concentration.
- Some reviewers wondered how we were going to mix our current graduate students with those in this new program. Quite simply there will be no mixing. There will be separate sections offered online for the new Master of GISc, and our research students in the MA and PhD programs will remain in residence and will continue to attend face-to-face lectures. We have enough faculty to teach all the courses in all programs.

Response to specific points in the reviews

- The Ohio State University was concerned that the local market for our proposed degree is too small. However, our intent was always to market nationally since this is a fully online program. Based on our market survey there is a very large demand for such programs in regions across the USA.

- The Ohio State University also wondered how this program would build on our existing undergraduate program. While technically an undergraduate student at Kent State could apply for this degree, they are not the target audience, and we would suggest that they apply for the research MA or apply to another institution.

- The Ohio State University saw the applied nature of our program as a weakness, yet other schools (Cleveland State University, University of Cincinnati) saw this as a strength. We see it also as a strength as no other programs across Ohio offer GIS programs in this way. Because of the applied nature of our proposed degree, Ohio State also questioned whether students will obtain enough depth in GIS. We can ensure all, that our program is fully developed and aligned with the University Consortium for GIScience Body of Knowledge. In addition, as part of the overall program, we will provide information to students on how to obtain the GIS Professional Certification (GISP) through the GIS Certification Institute; how their courses taken at Kent State, their practicum, and their additional work-related experiences can be compiled towards the certification.

- The University of Akron expressed concern that there were not enough hours in the program. In streamlining the degree we now have 32 credit hours (instead of 30 proposed in the PDP) which places us in the middle of the pack of all Masters in Geography programs in regards to credit hours.

- The University of Akron was also concerned with overlap with their geography Masters degrees. Programs. Since our proposed program is fully online designed for professionals, it will reach an entirely different audience than the Akron program which typically reaches students having just completed the undergraduate. Additionally, our specializations in health and CyberGIS are areas that Akron does not cover in any way, shape or form. We welcome the opportunity to collaborate on new courses in the environmental concentration. However, these courses must be available fully online, and must undergo the same rigorous development and review process which will result in Quality Matters certification. Akron also expressed concern on the lack of research training courses in this degree. Such courses are inappropriate for a professional degree and thus we still have not included them in this proposed degree.

- Bowling Green State University had a number of what we interpreted as minor concerns, simply because the PDP did not allow for elaboration. These concerns are all be addressed via the clarification statements above, and the inclusion of more detail in the full proposal, as well as the inclusion of faculty CVs. Specifically, we have made the case for outreaching to professionals rather than newly minted undergraduate students. Based on our analyses, professionals prefer a more flexible online environment that can integrate better with their busy schedule. Since these students are off-campus, they will be self-paying and ineligible for on-campus assistantships which require 20 hours of residency a week. We changed the concentrations from four to three to better focus and represent our faculty expertise. Our faculty are leaders in geospatial sciences with literally hundreds of publications between them, and multi-millions of research dollars. This is documented in their CVs. Our program will be fully online asynchronous, with no required set-time face-to-face feeds. The program is different than existing programs both in terms of focus and delivery. This is the first online GIS

program in the state; and the focus on health and cyberGIS in particular is unique. Finally, we are developing this new degree to reach a professional audience. This is entirely different from our on-campus research degrees.

- Cleveland State University had a number of smaller concerns and suggestions which should all be addressed via the clarification statements above, and the inclusion of more detail in the full proposal. Specifically, the concentration areas are very focused in comparison to how they were presented in the PDP. The premise is that there is a solid core for the degree (GIS; Advanced GIS; Cartographic Design; Practicum), then three concentrations, all focused on GIS applications in those concentrations. Each concentration has three required courses; then everyone takes 2 electives. This is far more structured than originally presented. Our program is different than Penn State's program in that ours is applied in nature and the concentrations (especially CyberGIS and Health and GIS) are very different. In addition, in a conversation with the director of the Penn State program, they noted that the demand was so high that they would welcome additional programs coming online, as they literally cannot handle the number of applications that they receive. There is no thesis option in this revision of our proposal. We are opting for a professional option only.