Brothers, Sheila C

From: Schroeder, Margaret <m.mohr@uky.edu>
Sent: Tuesday, February 03, 2015 9:08 AM
To: Brothers, Sheila C
Subject: Proposed New MS: Digital Mapping

Proposed New MS: Digital Mapping

This is a recommendation that the University Senate approve, for submission to the Board of Trustees, the establishment of a new MS: Digital Mapping, in the Department of Geography within the College of Arts & Sciences.

Best-

Margaret

Margaret J. Mohr-Schroeder, PhD | Associate Professor of Mathematics Education | STEM PLUS Program Co-Chair | Department of STEM Education | University of Kentucky | www.margaretmohrschroeder.com

NEW MASTERS DEGREE PROGRAM FORM

(Attach completed "Application to Classify Proposed Program"[1])

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OFFICE OF THE SENATE COUNCIL

GENERAL INFORMATION

College:	Arts & Science	Department:	Geography
Major Name:	Digital Mapping	Degree Title:	Masters (MS)
Formal Option(s):	N/A	Specialty Fields w/in Formal Option:	N/A
Date of Contact with Associate Provost for Academic Administration[1]:	8/22/2014		
Bulletin (yr & pgs):	New degree	CIP Code[1]:	45.0702
Today's Date:	9/30/2014		
Accrediting Agency (if applicable):	N/A		
Requested Effective Date:	☐ Semester following approval.	OR	☒ Specific Date[2]: 8/1/2015
Dept. Contact Person:	Matthew Zook	Phone:	218-0955
Email:	zook@uky.edu		

CHANGE(S) IN PROGRAM REQUIREMENTS

1.	Number of transfer credits allowed	4
	(Maximum is Graduate School limit of 9 hours or 25% of course work)	
2.	Residence requirement (if applicable)	The current residency requirements of the Graduate School will be followed.
3.	Language(s) and/or skill(s) required	This program has no language or specific undergraduate degree requirements. The first three courses of the Masters program are required to be taken in order and are designed to provide students with the necessary technical skills in GIS, programming and design for successful completion of the Masters program in digital mapping.
4.	Termination criteria	The current termination criteria of the Graduate School will be followed.
5.	Plan A Degree Plan requirements[3] (thesis)	There will not be a thesis option with this degree program.
6.	Plan B Degree Plan requirements[3] (non-thesis)	After taking 24 hours of course work each student will complete a six credit final project via the MAP698 (3 credits) and MAP 699 (3 credits) courses that produces a final mapping product distributed publically via an online portfolio. This course will require students to submit a project proposal that is reviewed by a full-time faculty member of the the NewMapPlus program. The final mapping project will require implementing the full range of technical skills acquired in the program as well as a paper in which the student reviews and analyzes the data, methods, findings, conclusions and possible critiques of the project. Each student will present and defend their project to a

[1] Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration (APAA). If you do not know the CIP code, the APAA can provide you with that during the contact.

[2] Programs are typically made effective for the semester following approval. No changes will be made effective until all approvals are received.

[3] If there is only one plan for the degree, plans involving a thesis (or the equivalent in studio work, etc.) should be discussed under Plan A and those not involving a thesis should be discussed under Plan B.

		committee made up of three fulltime faculty members of the NewMapsPlus program. Please see the new course proposal for MAP 699 for a full explanation of how this course will be structured.
7.	Distribution of course levels required	Three 3-credit course at the 600 level Four 4-credit courses at the 600 level One 2-credit course at the 700 level One 3-credit course at the 700 level
	(At least one-half must be at 600+ level & two-thirds must be in organized courses.)	
8.	Required courses (if applicable)	We are proposing to use the MAP prefix for these course and have confirmed its availability with the registrar. Please see question 12 for more details. MAP671: Introduction to New Mapping ... 3 MAP672: Programming for Web Mapping ... 4 MAP673: Design for Interactive Web Mapping ... 4 MAP674: Spatial Data Analysis and Visualization ... 4 MAP675: Collaborative Geovisualization ... 4 MAP701: History of Critical Cartography ... 2 MAP719: Social Impacts of New Mapping ... 3 MAP 698 Final Project Preparation ... 3 MAP 699 Final Project Implementation ... 3 Up to four credits of "MAP695: Special Topics in Digital Mapping" may be substituted for the required courses listed above with permission of the Digital Mapping faculty. However, MAP 701, MAP 719, MAP698 and MAP699 cannot be substituted.
9.	Required distribution of courses within program (if applicable)	N/A
10.	Final examination requirements	The final examination will consist of a realtime online oral defense (using the video conference technologies, e.g., Google Hangout or Skype, that has been utilized throughout the courses in the program) of the student's final project for a committee of three faculty members associated with the program.
11.	Explain whether the proposed new program (as described in numbers 1 through 10) involve courses offered by another department/program. Routing Signature Log must include approval by faculty of additional department(s).	
	All the courses for this program will be offered by the Geography department.	
12.	What is the rationale for the proposed new program?	

	Please see the attached document (15 pages) for our response to this question. The formatting restrictions of this form prevent the inclusion of key diagrams and tables necessary to this answer.

NEW MASTERS DEGREE PROGRAM FORM

Signature Routing Log

General Information:

Program Name: Masters in Digital Mapping

Proposal Contact Person Name: Matthew Zook Phone: 218-0955 Email: zook@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Geography, DGS		Patricia Ehrkamp / 7-6952 / p.ehrkamp@uky.edu	
Geography,Chair		Rich Schein / 7-2119 / schein@uky.edu	
A&S Dean's Office		Anna Bosch / 7-6689 / bosch@uky.edu	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision[4]
Undergraduate Council			
Graduate Council	11/26/14	Roshan Nikou	
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

[4] Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

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November 11, 2014

Richard Schein, Chair
Department of Geography
University of Kentucky
Lexington, KY

Dear Rich,

I am writing to express my enthusiastic support for the new, fully on-line M.S. Degree and Graduate Certificate in New Maps Plus that you and the New Maps advisory board and Geography department faculty have been working to develop over the past 18 months. The College of Arts and Sciences is very excited to sponsor this pioneering degree that will give practicing professionals the opportunity to extend their skills in the analysis and visualization of geographic data through an innovative online curriculum. The College fully intends to provide the resources needed to make this degree program, and the affiliated graduate certificate, successful.

The College of Arts & Sciences is well equipped to satisfy this need with a faculty who have achieved a superb record in research and publication, and in designing and teaching courses in digital mapping at the graduate and undergraduate level. Master' s degree candidates will benefit from instruction by a nationally-prominent faculty. Their study will be well-rounded as well as focused, and candidates will receive a wide range of academic and professional training through this online curriculum. The curriculum provides extensive experience with technical training in Geographic Information Systems (GIS) and online mapping, including the creation and use of geodata, as well as online spatial visualization tools.

The proposed Master' s degree and Graduate Certificate in New Maps Plus will afford interested individuals from across the nation the opportunity to pursue advanced study in complex mapping projects, and will train working professionals in a range of web-based systems for producing online geovisualizations and applications - areas in which our faculty have established national reputations. The University of Kentucky Geography department is a leading center for studies in critical GIS and public participatory cartography and analysis. Having a graduate program in digital mapping will position UK as an innovator in this area,

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providing an educational opportunity for citizens of the Commonwealth of Kentucky and elsewhere.

No additional faculty are needed to implement the certificate and Master's degree in New Maps Plus. Nonetheless, the College is open to the future possibility of additional hires in this general area, if enrollments so demand. In other ways, the resources required to run the program are already in place. The faculty needed to run the program and to teach its courses already exist, and the courses have been developed and are under review by university committees. Recruitment and publicity for these new programs will be handled centrally by Hive.

I appreciate the diligence and effort that you and the Program Faculty expended to achieve the goal of an innovative, fully online graduate certificate and Master's degree for the College. I look forward to seeing this important program established at the University of Kentucky.

Sincerely,

Mark Lawrence Kornbluh
Dean

cc: Ted Schatzki, Associate Dean of Faculty
Betty Lorch, Associate Dean of Research and Graduate Studies
Anna Bosch, Associate Dean of Undergraduate Programs
Kirsten Turner, Chief Financial Officer/Chief of Staff

UNIVERSITY OF KENTUCKY

Department of Geography

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817 Patterson Office Tower
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October 6, 2014

Educational Policy Committee
College of Arts and Sciences
University of Kentucky

Dear Colleagues,

Please be assured that the New Maps+ Certificate proposal submitted by Professor Matthew Zook and now before you has received full Geography Department faculty approval according to our department bylaws and the Geography Department has the resources to support the Certificate without impacting core program resources.

Sincerely Yours,

Richard H. Schein
Professor and Chair

Rationale for the New Maps+ Master's Degree (response to question 12 of New Master's Program Form)

A. Background and History for this Proposal

The lead faculty member for this proposal is Prof. Matthew Zook who can be reached at zook@uky.edu or 859-218-0955.

Note: the formal name for this proposal is a "Master's Degree in Digital Mapping". The term NewMaps+ is also used in this proposal in reference to the larger initiative that has been ongoing in the Geography department since 2011 and includes both this Master's degree as well as a graduate certificate.

A1. Overall plan

This proposal for a Master's degree is part of a larger initiative (referred to as NewMaps+) to create an online *graduate certificate* and a *master's degree in digital mapping* degree to train students in a range of web-based systems for producing online geovisualizations and applications. Information about location and spatial analysis has become ubiquitous in everyday life and central to an array of disciplines ranging from soil science to public health to the digital humanities and demand for geospatial technology expertise is burgeoning. Location-aware devices (such as smart phones) have saturated everyday life and present enormous opportunities for online mapping tools and analysis in applications ranging from smart-city and civic development to human-environmental relations to increasing demands for "big data" analytics. Our proposed tuition costs of $6,358 (11-credit graduate certificate) and $17,340 (30-credit Master's degree) based on current tuition costs for distance learning courses compare favorably to benchmark institutions.

The New Maps+ initiative provides a curriculum rich with technical training in Geographic Information Systems (GIS) and online mapping including the creation and use of geodata, cutting edge techniques for scraping geodata from social media and other web-based sources, as well as online spatial visualization tools such as TileMill and D3. Moreover the New Maps+ initiative challenges students to critically engage with potential pitfalls of online mapping such as locational privacy and changing technical standards. The University of Kentucky is well positioned with instructional assets in critical GIS and online mapping as well as strong ties to academic and industrial networks enabling the New Maps+ initiative to serve a largely untapped market in online degrees in GIS and mapping amid an unfolding location-aware future.

In order to establish the New Maps+ initiative in digital mapping, the Department of Geography is moving forward on several simultaneous fronts. These include:

- Ten new graduate course proposals submitted to the UK Faculty Senate for classes taught within the graduate certificate and Master's degree;
- A proposal to the UK Faculty Senate for a new graduate certificate (11 credits);
- A proposal to the UK Faculty Senate for a new Master's of Science degree (30 credits); and
- A proposal to the Council of Post-Secondary Education for the Master's degree under a different but closely related CIP code (45.0702, Geographic Information Science

and Cartography) to the currently existing CIP code (45.0701) associated with graduate studies in Geography.

All courses will be offered entirely online and take advantage of the latest online instruction technologies to provide video lectures, discussion and assignments.

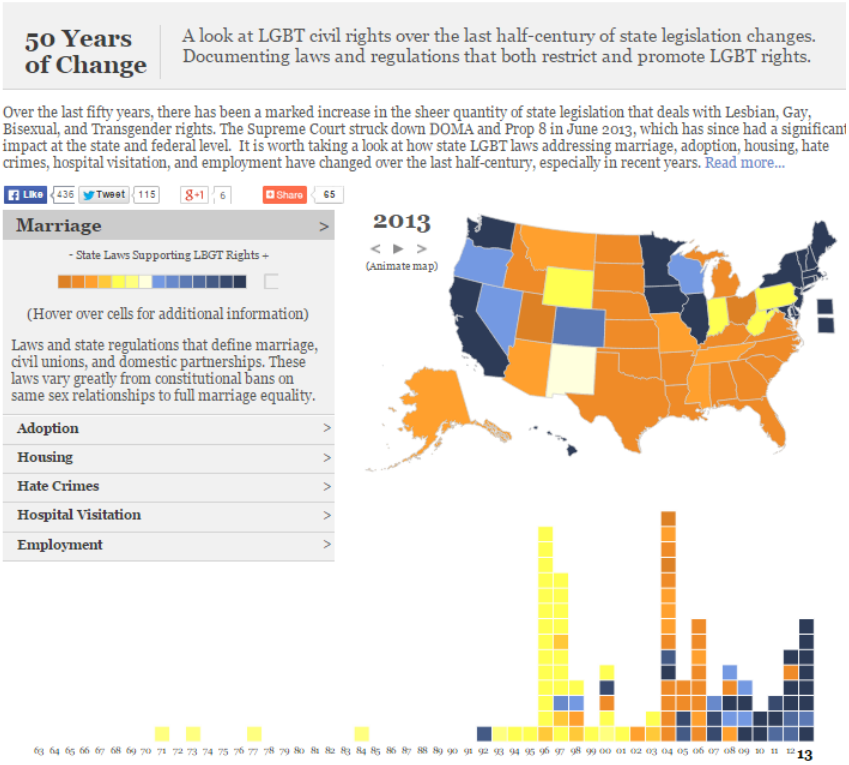
These new courses, certificate and Master's degree will not replace existing offerings. All courses, certificates and degrees currently associated with Geography will remain.

All resources (faculty, courses, computer equipment, etc.) necessary for running NewMaps+ are based in the Geography department. As this is an online degree, no classroom space resources are needed. We do have the necessary computer lab, server and infrastructural resources needed for NewMaps+.

A2. Examples of Likely Student Work

To get a sense of the kind of mapping project that students will be able to produce as a result of the program, please see the following two maps. Both of these maps were created by students and are the result of similar course work as proposed for this Master's degree. We expect our students will be working on much more complex mapping projects and implementing them in more sophisticated ways than these relatively simply examples.

50 Years of Change: An Animated Map Looking at Changing Legislation Related to LGBT Rights at the State Level



Source: http://50yearsofchange.com/

#Sandy: An Interactive Map of Tweets During Hurricane Sandy Visualized via WordClouds and Hex Maps

Source: http://www.geo-odyssey.com/links/sandy/

A3. Development and Funding History

The Department of Geography has been focused on expanding its curriculum in geographic information systems (GIS) and digital mappings since 2010 when it conducted a nationwide search and hired two faculty members -- Dr. Jeremy Crampton (GIS, critical cartography) and Dr. Matthew Wilson (GIS, public participation) who joined the department in the Fall of 2011. They joined existing faculty members – Dr. Matthew Zook (online mapping, geosocial media), Dr. Daehyun Kim (spatial analysis) and Dr. Liang Liang (remote sensing) – and have established the department as a leading center for studies in critical GIS and public participatory cartography and analysis. In August 2014, Dr. Rich Donahue, an expert in online mapping pedagogy, joined the department in a post-doc position to work on the NewMaps+ initiative. As part of this effort the New Mappings Collaboratory (http://newmaps.as.uky.edu/) was established to jointly work on research and teaching efforts involving online mapping and critical GIS.

Towards this goal the Geography department and New Mappings Collaboratory hosted a workshop event during May 2013 in which a dozen of the leading educators in the field of digital mapping were brought to UK campus and engaged in a week-long intense curriculum development process. This initial curriculum building process was support by funding from the Dean of the College of Arts and Sciences as well as the Department of Geography. Building upon this foundation Dr. Matthew Zook led a proposal writing process in response to a call for proposals from the University of Kentucky eLearning Innovation Initiative (eLII), a joint effort of the Office of the Provost, UK Analytics and Technologies (AT) and the Center for the Enhancement of Learning and Teaching (CELT). The proposal was awarded a grant of $200,000 in January 2014 (see http://www.uky.edu/elii/onlinedegreeinitiative/awardees) and degree and course design efforts began in earnest.

Curriculum development for all courses in the graduate certificate and Master's degree is taking place throughout the 2014-15 academic year with the bulk of work completed by May

2015 when the eLII grant ends. In addition to curriculum, the grant also provides funding for promoting NewMaps+ nationally to attract students.

A4. Using the MAP Prefix

The Department of Geography is seeking the MAP prefix as part of a its proposed online graduate certificate and Master's degree in digital mapping that has been funded by the eLearning Innovation Initiative (eLII) at UK (see http://www.uky.edu/elii/). This new initiative grow out of existing work in the department but also represents a new focus within in the department, particularly an expansion to our work within the fields of GIS, digital mapping and critical cartography. The initiative will train students in a range of web-based systems for producing online geovisualizations and applications and provides a curriculum rich with technical training in Geographic Information Systems (GIS) and online mapping including the creation and use of geodata, cutting edge techniques for scraping geodata from social media and other web-based sources, as well as online spatial visualization tools such as TileMill and D3. Moreover the New Maps+ initiative challenges students to critically engage with potential pitfalls of online mapping such as locational privacy and changing technical standards.

The MAP prefix would provide two key advantages – emphasis and differentiation -- as we move forward. First, the MAP prefix emphasizes the mapping focus of the initiative vis-à-vis other fields of study within Geography. Maps have long been a key part of our discipline and this prefix will be useful in highlighting this within our new set of classes. Second, the MAP prefix will provide a useful means of differentiating between this new initiative (which will be entirely online) and our existing graduate degrees. Moreover as part of the new initiative and MAP prefix we are also seeking a different but closely related CIP code (45.0702, Geographic Information Science and Cartography) and degree (MS) which contrasts with the existing CIP code (45.0701) and graduate degrees associated with Geography, MA and PhD. We will have different sets of admissions criteria and learning objectives for this new initiative and the MAP prefix will help us organized this.

We have received confirmation from David Timoney, Associate Registrar for Communications at the University of Kentucky that the MAP prefix is currently available.

B. Demand for digital mapping education

Geographic data and its analysis and visualization are increasingly prevalent in the global economy and the range and power of online mapping tools is expanding. The enormous range of commercial uses for geographical data means that geospatial technology market is growing at 35 percent per year overall while the commercial market is increasing by 100 percent annually.[1] The U.S. Department of Labor further notes that, "the widespread availability of advanced technologies offer great job opportunities for people with many different talents and educational backgrounds."[2] Thus, the New Maps+ initiative is positioned within a growth sector of the economy and we anticipate considerable demand for both the graduate certificate and the Master's degree.

[1] US Department of Labor. (2012). High growth industry profile – Geospatial technology. Retrieved on December 15, 2012 from http://www.doleta.gov/brg/indprof/geospatial_profile.cfm

[2] US Department of Labor. (2012). High growth industry profile – Geospatial technology. Retrieved on December 15, 2012 from http://www.doleta.gov/brg/indprof/geospatial_profile.cfm

Indeed a number of universities have also seen this demand and offer a range of initiatives. A survey by the Geography department and information from Geotechnologies expert Dr. Chris Lukinbeal (University of Arizona) identified benchmark initiatives at other universities offering certificates and Master's degrees in GIS: Penn State University (PSU), Denver, Northwest Missouri, USC, UW, American Sentinel (a for-profit in Denver), and Delta State in Mississippi(see Figure 1). This review highlights the range of definitions of online programs. While some (such as PSU) are fully online, other initiative have an in person component (such as one week when students are expected to be on campus or some other location together). (2) Universities with certificate initiatives generally allow certificate credits to count for a Master's degree if the student chooses to continue. Our understanding is that much of the demand (and revenue) is generated via the certificate rather than Master's initiatives. (3) There is considerable demand for these initiatives. The largest online initiative, Penn State, has 800 students in the initiative at any given time, mostly enrolled in the certificate. USC has about 180 students in a cohort, while the smaller initiatives have cohorts of approximately 30 students. A summary of our survey including number of credit hours and cost is provided in Figure 1.

Lukinbeal's research shows demand for these initiatives is intense and many initiatives are relatively expensive compared to New Maps+. Our cost of $8,670 for a 15 credit graduate certificate and $17,340 for a 30 credit Master's degree is extremely favorably compared to the average cost of $28,000 for a Master's. Lukinbeal's research also shows online initiatives tend to draw from a regional pool of students, putting us most directly in competition with Northwest Missouri, Delta State and WKU, initiatives that we are confident we can outperform in high quality online education.

Figure 1: Benchmark GIS Certificates and Master's Initiatives

	Focus	Certificate	MA	Credit Hours	Time to Finish	On Line	In person	Cost per credit hour	Total cost*
PSU -1	Post-BA (prep for MA)	X		11	1 year	X		$736	$8K
PSU -2			X	35	2 years	X		$736	$25.7K
AU			X	30	3 sems.		X	In/out state $422/$936	In/out state $12.6K/ $28K
ASU			X	30	11 mths		X		In/out state $24.9K/ $42.4K
UW-1	Sustain. Mgmt.		X	45	9 mths	X	X	$595	$26.7K
UW-2	Requires a BA or 2 yrs college + work	X		18	9 mths		X		$4.3K
USC -1	Can feed into to MA	X		16	1 year	X		$1473	$23.6K

USC-2	Includes one week in field		X	28	16-20 mths	X		$1473	$41.2K
West. KY Univ. (WKU)	WKU students, limited online	X		13-16	1 year		X	$445	$7.1K

* All initiatives also have fees which add 1-2K to the price of the degrees listed in the table.

Finally, and arguably most important, is that while New Maps+ shares a general goal of providing students with workplace skills in mapping, the graduate certificate and Master's degree initiative focuses exclusively on open source (i.e., free) mapping software. This helps distinguish NewMaps+ from other online offerings and expands the appeal of digital mapping education to new fields, such as marketing and web design as well as traditional users of GIS (e.g. city government and environmental management workers). In short, the New Maps+ initiative targets a fast growing industry and provides a distinctive training strategy that positions it extremely well to tap unmet market demand.

C. Design of NewMaps+

This section presents: an overview of the New Maps+ initiative, targeted population, course structures and schedules and the faculty of record.

C1. Overview of the NewMaps+

The Geography Department of the College of Arts and Sciences is proposing an entirely online initiative called New Maps+ that offers both a *graduate certificate in digital mapping* and a *master's degree in digital mapping*. The graduate certificate component consists of three courses (11 credits) and the Master's degree extends the certificate with an additional 19 credits, including a final project. The proposed timetable is to first enroll students in the graduate certificate in September 2015 and students in the Master's degree by January 2016. However, the exact dates depend upon the Faculty Senate review process.

The courses for the m*aster's in digital mapping* are based on previous experience with existing face-to-face courses at U.K. but also incorporate new material specifically tied to digital mapping tools and services. Therefore we have proposed a series of new courses using the MAP prefix. The degree targets students with a bachelor's degree in any field although experience with cartography, GIS or web programming would be useful. The first three courses in Master's degree are required to be taken in order and are specifically designed to provide students with the necessary technical skills in GIS, programming and design for successful completion of the Master's degree in digital mapping.

The proposed courses of Master's degree are below and arranged in the order in which a student would take them. Students would first complete 11 credits of foundational courses, followed by 13 credits of courses that would expand their skills, insights and engagement with mapping. Upon completing these 24 credits students would take two courses for three credits each to prepare and implement their final Master's project.

Prefix	Number	Title	Prereq	Credits
		Foundational Courses (11 credits, take all in order)		
MAP	671	Introduction to New Mapping	-	3
MAP	672	Programming for Web Mapping	671	4
MAP	673	Design for Interactive Web Mapping	672	4
		Expansion Courses (need 13 credits total, any order)		
MAP	701	History of Critical Cartography	-	2
MAP	719	Social Impacts of New Mapping	671	3
MAP	674	Spatial Data Analysis and Visualization	672	4
MAP	675	Collaborative Geovisualization	673	4
MAP	695	Special Topics in Digital Mapping		variable, 1-4
		Final Project Courses (6 credits total, in order)		
MAP	698	Final Project Preparation	674&675	3
MAP	699	Final Project Implementation	674&675	3
		Total		30

A guiding principle of course design is distinguishing between 1) fundamental concepts 2) methodologies and research design and 3) specific techniques and technologies. The reason behind this is to organize course materials in ways that will optimize continual program evaluation and up-to-date content. For example, much of the material on fundamental concepts and idea will remain valid and will likely have a longer refresh cycle than modules focused on specific techniques and technologies. We anticipate the some parts of the latter will be updated every year (as technology changes) while the former will only be reviewed and updated on a three to four year cycle.

C2. Learning Objectives

The overall learning objectives for the proposed Master's degree consist of basic and advanced learning objectives. The basic learning objectives will be achieved via the first three courses (MAP671, MAP672 and MAP673) although later classes will provide further opportunities to meet these objectives as well. These basic objectives are:

- Identify the appropriate applications of different forms of geospatial data, analytical techniques and mapping software platforms.
- Gather, integrate, transform and analyze geospatial data from multiple sources.
- Create static and interactive maps and visualizations in accordance with prevailing and rigorous cartographic standards.
- Develop basic web-based initiatives and scripts utilizing web standards to enhance user interaction with maps.
- Identify and implement appropriate applications of design components to maximize the usability of maps.
- Construct a publicly-available online portfolio of data, code, maps and accompanying explanations on an online sharing platform such as Github.

In addition to these basic objectives, the degree has a number of advanced objectives that will be met via the remaining courses. These advanced objectives are:

- Analyze a geographic problem using advanced techniques of quantitative spatial analysis.
- Build online visualizations that integrate spatial analysis, web programming and advanced design techniques.
- Discuss the relationship between contemporary cartographic practice and historical developments in cartographic thought and methodology.
- Explain the social context and implications of digital mapping, big data, crowdsourcing, and integrate this understanding in mapping projects.
- Produce professional-quality, collaborative, interactive mapping projects, using advanced web-based geospatial techniques, that improves understanding of a given geographic issue.

C3. Target Population and Admissions

The target population for the Master's degree is expected to be working adults who wish to pursue a course in digital mapping and value the flexibility that an online course provides. We anticipate students coming from the traditional backgrounds using mapping, *e.g.,* urban planning and transportation but also see great opportunities for students coming from business and marketing, journalism, design fields as well as the non-profit sector. As maps and spatial information become ever more integrated into daily life demand for digital mapping skillsets will increase in the commonwealth, nation and world. Given the online nature of the courses we expect enrolled students to come from every part of the country and world. In addition we expect these courses to be of interest to current University of Kentucky graduate and postbac students. Our courses would be open to these traditional students although subject to the prerequisite requirements and the guidelines of their departments.

Given the background of our expected students (working adults) we have designed a course structure of ten weeks rather than the traditional semester system. This has a number of key advantages including the ability for students to start taking classes at four different times in the course of the year. We anticipate this to be very useful to working students who lives are not organized around a two semester system and should better serve them. See below for a review of how this will be structured.

Admission into the Master's degree will be done through the Graduate School of the University of Kentucky with standard admission dates and criteria.

C4. Course structures

NewMaps+ courses are designed around a length of ten weeks rather than the traditional 16 week semester and given the compressed time schedule the course work (both in class time and assignments) is much more intensive in order to provide the same level of instruction. For example, a course is three credits and will consist of a total of 4 hours of in class time (via the Canvas LMS) and assignment work that will take an average student about 12 hours to complete (see table below).

In class time could consist of video lectures (approximately 1.5 to 2.5 hours per week), written instructions/lectures and exercises (approximately 1.5 to 2 hours per week) and class discussion/group troubleshooting around specific topics (approximately 1 to 1.5 hours per week). The exact distribution depends upon the topic and learning objectives for the course.

Comparison of ten week course structure to 16-week semester courses

	3-Credit Semester Course	4-Credit Semester Course	2-Credit Intensive 10 Week Course	3-Credit Intensive 10 Week Course	4-Credit Intensive 10 Week Course
Credits	3	4	2	3	4
Weeks	16	16	10	10	10
IN CLASS TIME					
Total in class time (hours)	40.00	53.33	26.67	40.00	53.33
Total in class time per week (hrs/wk)	2.50	3.33	2.67	4.00	5.33
OUT of CLASS TIME (Estimated 3 hours for every in class hour)					
Total out of class time (hours)	120.00	160.00	80.00	120.00	160.00
Total out of class time per week (hrs/wk)	7.50	10.00	8.00	12.00	16.00
TOTAL CLASS TIME					
Total class time (hours)	160.00	213.33	106.67	160.00	213.33
Total class time per week (hrs/wk)	10.00	13.33	10.67	16.00	21.33

Note: This table uses the metric of 800 minutes (13.33 hours) of in class time per credit per semester. Thus, a three credit semester long course meets for 150 mins per week.

C5. Yearly Schedule

In order to design an initiative around ten week courses we have devised an alternative yearly schedule consisting of four ten week course periods and four breaks of two to six weeks. This ensures that courses can be regularly offered and also provides time for revising and updating course material during the break periods. It also provides the means to construct a steady and controlled roll-out of courses so that prerequisites are offered on an ongoing and regular basis. The Master's degree will follow the graduate school rule regarding student enrollment in consecutive semesters, leaves of absences and readmission.

The schedule also overlaps at key moments with the existing academic calendar, most notably, our proposed Fall session is complete within the Fall semester and our proposed Winter session is within the Spring semester. This would make it possible for regular University of Kentucky graduate students to enroll in courses.

The start time of courses depends up the approval process but we have outlined a proposed calendar below based on approval for a start in the Fall 2015 semester. This will be amended as necessary but will adhere to the following scheduling rules.

- The exact dates of the four course periods and four breaks will be fixed to the yearly schedule of the University of Kentucky.
- More specifically, the start of the ten week Winter session will be the Monday following the start of the official Spring semester of the University of Kentucky.

- The starting dates for the remaining three course periods (each ten weeks long) will be adjusted by varying the length of the break periods (between two and six weeks) as necessary to conform to UK registrar requirements.
- Credit for courses will be assigned (e.g., appear on transcripts) to regular UK semesters and summer sessions as determined by the registrar.

We have met with David Timoney of the Registrar's Office and he has confirmed that this calendar can work with UK systems.

		Wks	671 Intro	672 Programming	673 Design	674 Spatial Analysis	675 Collaborative GeoViz	701 History	719 Seminar	698 Final Proj Prep.	699 Final Proj. Implem.
Fall Session	10/4/2015 to 12/12/2015	10	Week1 | Week10								
Winter Break	12/13/2015 to 1/16/2016	5									
Winter Session	1/17/2016 to 3/26/2016	10	Week1 | Week10	Week1 | Week10				Week1 | Week10			
Spring Break	3/27/2016 to 4/9/2016	2									
Spring Session	4/10/2016 to 6/18/2016	10	Week1 | Week10	Week1 | Week10	Week1 | Week10				Week1 | Week10		
Summer Break	6/19/2016 to 7/9/2016	3									
Summer Session	7/10/2016 to 9/17/2016	10	Week1 | Week10	Week1 | Week10	Week1 | Week10	Week1 | Week10		Week1 | Week10			
Fall Break	9/18/2016 to 10/1/2016	2									
Fall Session	10/2/2016 to 12/10/2016	10	Week1 | Week10	Week1 | Week10			Week1 | Week10		Week1 | Week10		
Winter Break	12/11/2016 to 1/21/2017	6									
Winter Session	1/21/2017 to 4/1/2017	10	Week1 | Week10	Week1 | Week10	Week1 | Week10	Week1 | Week10		Week1 | Week10		Students begin final projects after completing all required courses.	

C6. Faculty of Record

The faculty of record the Master's degree will be the graduate faculty of the Department of Geography. There are a number of internationally research active and world-renowned

Geography department faculty whose teaching and research directly engage the focus of the New Maps+ initiative. In addition to topical expertise many faculty have experience in designing and delivering online and hybrid course design and there presently is a working group dedicated to those goals. The New Maps+ initiative will draw upon the following Geography faculty:

Dr. Jeremy Crampton is a key figure in the GIS & Society movement as well as critical cartography. He is developing an open-mapping research initiative at UK and has begun working with hybrid models of GIS courses to provide more flexibility for students.

Dr. Daehyun Kim is a biogeographer researching the spatial patterns of vegetation and landform via simulation models, geographic information systems and spatial/multivariate statistics in order to analyze and visualize dynamics of complex biogeographic systems.

Dr. Liang Liang researches bioclimatology and explores the timing of life cycle events such as bud burst and flower bloom via remote sensing and geographic information systems.

Dr. Matthew Wilson is an expert on public participation GIS and has designed a number of new U.K. courses including *GEO109: Digital Mapping* and the *GEO509 Workshop* on collaborative mapping using online technologies. He is also a key figure in disciplinary discussions on the transitioning of traditional GIS courses to online environments.

Dr. Matthew Zook won U.K. Provost Teaching Award in 2013 and researches geographically referenced social media data to study the spatial patterns of society. He founded the popular geovisualization blog, FloatingSheep (featured in the *Economist*, *CNN*, *BBC World Service*, and *WIRED Magazine*) and has developed new course on web scraping and visualization.

The Geography Department Working Group for online and hybrid courses presently is working with HIVE and CELT to transition key Geography courses to more on-line based content and instruction, and includes faculty with experience and expertise in on-line teaching as well as substantive research expertise which might be utilized for course modules empirically dedicated to specific topics; including political ecology, urban studies, social theory and cultural landscapes. The working group includes Dr. Lynn Phillips, Dr. Tad Mutersbaugh, Dr. Richard Schein and Dr. Alice Turkington.

The Geography department also has strong collaborative relationships with a range of other departments and colleges at U.K. engaged in GIS and mapping. These include Agriculture, Civil Engineering, Digital Humanities, Earth and Environmental Systems, Historic Preservation, Fine Arts, History, the Kentucky Transportation Center and Landscape Architecture. This collaborative work is organized via the New Mappings Collaboratory (http://newmaps.as.uky.edu/) which comprises scholarship at U.K. focused on public engagement, "big data" and user-generated Internet content.

D. Online Teaching Strategies

This section reviews strategies of ensuring quality learning, a review of the technologies entailed and strategies to ensure high instructional quality.

D1.Strategies for ensuring quality online learning

The New Maps+ Design Strategy aims for the highest quality student learning experience and is fundamentally predicated upon quality interaction with the instructor. We are concerned with the careful and best use of educational technologies requiring instructors to embrace the disruptive promise of online teaching rather than simply mirroring offline approaches. This

strategy requires instructors to be: (1) flexible in adjusting course learning objectives; (2) open to experience of other online projects; (3) willing to experiment both with technologies and pedagogy; (4) constantly attentive to assessing what works and what falls short. Too many online learning efforts have stalled because the transition from the classroom to the computer sought solely to replicate the face to face experience rather than take full advantage of online interaction possibilities.

Often this has meant a distilling of the substantive learning objectives of face-to-face interaction, as opposed to thinking through the transformative moment in the face-to-face classroom, which is part substance and part process. Many online courses only focus on the substance of learning, at the expense of the processural. The unfolding of a process of learning in face-to-face moments is not easily or directly transferable into the online course, and we see this as perhaps the most impactful challenge at the center of the proposal. To address this we outline specific steps to ensure that the quality of our online instruction is equal to or exceeds face-to-face interaction.

D2. Reviewing the technologies used in New Maps+

Since the Spring 2013 semester the Geography department has intensely reviewed instructional and online mapping technologies in order to build successful online mapping courses. A particularly central technology is the learning management system (LMS) and we have select Canvas for the New Maps+ initiative. We choose Canvas as a LMS for a range of reasons. The Canvas system architecture (built on Ruby on Rails) and open source code are philosophically appealing for the New Maps+ initiative, which includes training in Ruby programming and primarily focuses on open source mapping services. More importantly, the Canvas user and instructor interfaces provide an uncluttered and modern interaction. This complements the sensibility and design of the New Maps+ initiative and the interface (including the Canvas API) also translates into easier course design and implementation. Other strengths of the Canvas system include the smooth incorporation of many Web 2.0 technologies that we anticipate will be key resources for our students. Simple things such as easy integration of Google documents, Facebook, and Twitter means that Canvas facilitates the use technologies that already familiar to our students. We also have experimented with feature set of Canvas, particularly assessment engines and grading, and are satisfied that they meet the needs of the New Maps+ initiative.

Camtasia is a second instructional technology that we have evaluated and begun to use for content production. The nature of the material covered in the graduate certificate and Master's degree – online and computer based mapping – means that the ability to capture on screen video and audio narration is essential. Our experiments with script-writing and rehearsal have taught us to create smooth and concise video instructions that minimize time length and yet convey key information. We have also experimented with Echo360 to capture classroom lectures and talks by distinguished visitors but at this time do not expect to use it extensively. This is largely because of the challenges associated with adapting offline class structures with our plan for online courses.

We anticipate using multiple technologies for direct communications with students but plan to primarily use Canvas given the advantages of a centralized LMS. This would include notifying students of course events via their preferred method of contact. We are still evaluating our preferred technologies for live meetings (such as synchronous final project charrettes). While

U.K. offers Adobe Connect, we also value technologies more widely used by our potential students. In particular, the conferencing system offered by Google Hangout is versatile and has the advantage of being tied to the larger Google suite of software.

The Canvas LMS seems to fall short regarding peer learning and discussion, and here we remain undecided on a specific technology for standard online functions such as newsgroups and chat. In particular, we are interested in archiving one-to-one interactions about common issues for future use, both within a current course but also for future semesters. We are evaluating software solutions such as Piazza (https://piazza.com/) that channels common instructor-student interaction about assignments or due dates into a FAQ-styled interface that can be more widely shared. At the course's end, topics in the FAQ could be archived into a more permanent format such as a course Wiki. We are still evaluating and experimenting with specific software systems and we will want to consult extensively with the UK eLearning staff before adopting any.

Another decision that remains unresolved is the technology for peer evaluation as the Canvas LMS seems limited in this arena. Our prior experience with online peer learning indicates that key issues are: (1) sharing materials among course participants and (2) collecting and aggregating peer feedback and evaluation. A unique challenge to the New Maps+ initiative is that project material is often in the form of visualizations rather than text or numeric answers to problem sets. Although we look forward to feedback from eLearning staff we have found workable solutions by combining a shared blog (with each student sharing their map) with commenting (for general feedback and commentary) and free online survey systems (for collecting more sensitive, grade related evaluations).

Outside video services strategically inserted into New Maps+ courses constitute the final area of online technology. For example, our courses require students to be familiar with basic computer functionality but in face to face settings we regularly encounter students unfamiliar with navigating directory structures or unzipping compressed files. Rather than devote our energies to providing answers we plan on using services such as Lynda (http://www.lynda.com/) which offer short video clips on basic computer skills. The modest $25 per month fee would be something that students would pay in addition to tuition for the courses with specific video incorporated into the course FAQs and Wikis. Likewise, we see that many of the videos offered via Ted Talks (http://ed.ted.com/) or The Open Video Project (http://www.open-video.org) could be usefully incorporated into New Map+ courses.

New Maps+ initiative will also use a number of online mapping technologies. These include (1) Google Maps, Google Earth and the Google Maps Engine; (2) mobile phone based applications such as EpiCollect and Fulcrum for collecting and sharing user generated field data; (3) GeoCommons, TileMill and CartoCSS for designing online, interactive maps; (4) the JavaScript scripting language to be used for scraping online geographic data; and (5) the D3 JavaScript library used for creating online interactive visualizations (including but not limited to maps). In addition to leveraging the pre-existing free tutorials that come with many of these mapping technologies we will create our own videos (via Camtasia) to demonstrate specific course related tasks.

D3. Strategies for ensuring instructional quality

Our strategy for ensuring instructional quality in the New Maps+ initiative is closely tied to our strategic vision for high quality student learning environments and the specific steps we will take to ensure that the quality of our online instruction. We see flexibility in course design,

openness in learning from previous experience, experimentation with both technologies and pedagogy and attentiveness to what works as fundamental aspects of high quality online instruction and instructors.

We have a number of specific strategies designed to ensure that these attributes are front and center during the development of New Maps+. First, and most importantly, is the active and enthusiastic participation of key faculty members under the leadership of Dr. Matthew Zook, Director of GIS Programs for Geography. We have been working on the NewMaps+ initiative for years and are committed to it as a key outcome of the catalyzing energies of the New Mappings Collaboratory. Second, is the strong support of the entire Geography department and the College of Arts and Sciences to provide the necessary backing to make this initiative happen. This includes seed financing from the Dean of A&S to work on initial course content development and the commitment of key personnel by the Geography Department Chair.

Third is the involvement of Dr. Rich Donahue as full-time postdoc working with faculty to convert content originally designed for face to face interaction to an online course format. This entails ongoing consultation with the U.K. eLearning team on course design using standards from the Quality Matters rubric. Faculty members will still be the primary source of content, but Dr. Donahue is an expert in online mapping pedagogy and the supervision and collaboration with Dr. Zook ensures a uniform set of high standards and continuity of design across all modules and courses.

Fourth, the instructional quality of the New Maps+ initiative will also draw upon the compelling and evocative nature of our learning content. To ensure this, we leverage our existing networks at the interface of design and mapping to draw professionals to interact with our instruction and our students. We believe that both the learning content and the pedagogical strategies associated with ‘mapping’ are shifting. Maintaining the pulse as well as the contours of these changes will allow us to adapt quickly and best serve our learning audience, who we expect to be highly dynamic participants in our degree initiative.

D4. Ensuring quality relative to F2F instruction

To ensure high educational quality and student success that is equal to or exceeding face-to-face interaction we build from the premise that a simplistic translation of course material designed for face-to-face instruction is not the solution. Instead, we recognize the need to first distill the learning objectives from our conventional face-to-face instruction and then iteratively design online experiences to reach those objectives. Our working approach is detailed here.

Ensuring high quality online experience requires the successful use of a learning management system (LMS). We have adopted the Canvas LMS for this program which is consistent with the larger University of Kentucky policy to switch from Blackboard to Canvas. Our own evaluation of Canvas indicates that it provides good flexibility for giving detailed and incisive feedback to students at multiple stages (quizzes, labs, projects) of their learning process. This ability to provide a steady stream of feedback to students is key to our vision of quality online learning.

While faculty in the Geography department have considerable experience with online classes we also will be drawing upon the expertise of others. For example, we are in discussions with the U.K. eLearning team on a number of topics including strategies for matching our learning outcomes to appropriate assessment metrics, converting existing content (developed for face to

face interaction) to the online environment and adapting established standards from national benchmarks for online education to NewMaps+.

We are also experimenting with various formats both for online content delivery as well as assessment of student learning. For example, as much of the content for both the graduate certificate and Master's degree is project oriented, we envision a course design in which students iterate first through a number of online labs to build skills and then hone these skills via a series of online mapping projects. We anticipate spending considerable time designing the feedback on these skill-building labs and projects. For example, simple multiple choice quizzes graded automatically can be useful I alerting students to comprehension issues and/or allow us to re-emphasize key parts. More open-ended assignments or outputs such as maps that are assessed in visual terms require much more nuanced evaluation and feedback. For such projects we will experiment with a range of synchronous and asynchronous feedback from instructors and fellow students. We will pilot test these systems during course development (including our Curriculum Camp) to select the best mechanisms for online charrettes of final student projects. Ultimately these reviews for final Master's projects will include guest design critics from industry although the awarding of the degree remains the decision of the Faculty of Record.

E. Assessment & Evaluation Plan

We are developing and integrating assessments instruments throughout the courses to provide students with ongoing feedback and to provide faculty with metrics on student comprehension to target specific interventions into course content and instructional technology improvement. For example, we plan that 2-3 short assessments/quizzes (primarily evaluated algorithmically) will be included throughout the course of each of 15 to20 teaching modules that make up a course to provide regular checks on learning and feedback for students. We will also integrate longer labs/tests (evaluated both algorithmically and by instructors using rubrics) at the completion of each module with a final project at the end of each course (primarily evaluated by instructors using rubrics).

In addition to the specific assessments built into each course, we will also develop programmatic evaluation and assessment. The programmatic assessment will be built around the learning objectives for the Master's degree as outlined in this proposal. The specific ways of measuring these objectives will be decided during the development and operation of the courses. Our plan is prepare two basic types of deliverables for the programmatic assessment including (1) quantitative data for selected assignments in courses that reflect programmatic goals and (2) artifact collection from courses, likely final projects that will be most reflective of programmatic objectives. Both types of deliverables will be drawn from the LMS Canvas which we will be using for this initiative.

A key part of the initiative is training students to build and maintain portfolio websites (via GitHub) to publicly share their completed work as a means of professionalization. These portfolios will help students in seeking employment, serve to showcase the New Maps+ initiative, and also provide a public system to assess the technical skills gained by our students.

We also plan to assess the career outcomes of certificate earners through regular contact with our alumni. Logistically this will be done via online social network systems (e.g., LinkedIn, Twitter) but also through in-house databases of basic contact information (email, phone, twitter handles) that will be used to formally and informally survey alumni about 1) their current career and salaries; 2) the ties between courses and subsequent work tasks; and 3) input on additions or

changes to the course material. This alumni networking should also prove useful for helping more recent graduates establish themselves in the field.

Finally we will create an outreach council composed of academic and industrial leaders whose opinions will be sought to help in the assessment of the overall value and structure of the degree. Towards that end the council will be regularly surveyed (both formally and informally) to provide input on: the content of the degree and post-degree employment. All decisions about the degree, however, remain the responsibility of the Faculty of Record for the Master's degree. The Faculty of Record and the Geography Department's Chair and Director of GIS Programs will serve as in-house *ex officio* board members to ensure institutional accountability.

We have identified an initial target list of outside people based on strong faculty contacts. Furthermore the vast majority of those listed below have already visited Lexington to give a talk or collaborate with U.K. faculty. This list includes, Dr. Mike Batty (Professor and Director of the Centre for Advanced Spatial Analysis, University College, London); Ms. Shannon Dosemagen (Director of Community Engagement, Education and Outreach, Public Labs); Dr. Sarah Elwood (Professor, University of Washington); Dr. Michael Goodchild, (Professor Emeritus, UCSB); Dr. Sean Gorman (Founder of GeoCommons); Dr. Mark Graham (Director of Research, Oxford Internet Institute); Ms. Lize Mogel (Director of Atlas of Radical Cartography); Mr. Eric Rodenbeck (Founder of Stamen Design); Dr. Daniel Sui (Professor and Chair, Geography, Ohio State University); Mr. Andrew Turner (author of *NeoGeography*); and Mr. Derek Watkins (graphics editor at the New York Times).

Ellis, Janie

From:	Nikou, Roshan
Sent:	Wednesday, November 26, 2014 10:23 AM
To:	Brothers, Sheila C; Carvalho, Susan E; Ellis, Janie; Ett, Joanie M; Hippisley, Andrew R; Jackson, Brian A; Lindsay, Jim D.; Nikou, Roshan; Price, Cleo; Timoney, David M
Cc:	Schein, Richard H; Zook, Matthew A; Vaillancourt, Lisa J; Lauersdorf, Mark R; Tanaka, Keiko; Perkins, Andrea L; Erwin, Heather; Badurdeen, Fazleena F; Buntin, William J; Huber, Jeffrey T
Subject:	GC Transmittals
Attachments:	MS in MAP-signed.pdf; GC in MAP-signed.pdf; Plant Pathology Dual Degree-signed.pdf

TO: Andrew Hippisley, Chair and Sheila Brothers, Coordinator
Senate Council

FROM: Brian Jackson, Chair and Roshan Nikou, Coordinator
Graduate Council

Graduate Council approved the following proposals and is now forwarding them to the Senate Council to approve. All the courses listed below have been forwarded to the Senate Council via e-Cats.

Programs and Certificates (attached)

Plant Pathology Dual Doctoral Degree **(this is not a new program and does not involve modifications to requirements for an existing degree)**

Masters in Digital Mapping **(There are 10 MAP courses related to the Masters in Digital Mapping; I am sending 5 of them with this transmittal and will send the remaining 5 as soon as they get the GC's approval)**

Graduate Certificate in Digital Mapping

Courses (on e-Cats)

LIN 629 Advanced Historical Linguistics

LIN 695 Directed Studies in Linguistics

SOC 781 Quantitative Data Analysis II

ME 799 Mechanical Engineering Graduate Seminar

CPH 763 Ethics for Public Health