

## Glemaud, Rose-Ketlie

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**From:** Mallery, Charles H.  
**Sent:** Tuesday, September 15, 2015 9:57 AM  
**To:** Glemaud, Rose-Ketlie  
**Subject:** Department of Geography proposals for a BS in GEG and a Minor in Geospatial Technology

Rose,

The Curriculum Committee reviewed proposals for a BS major in GEG and a Minor in Geospatial Technology and approved the same for consideration by the College Council.

Thanks Charly,

charles mallery, associate dean, college of arts & sciences  
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# Memorandum

To: College of Arts and Sciences Curriculum Committee

From: Department of Geography (Ira Sheskin, Chair)

Date: September 15, 2015

Subject: Changes to the Department of Geography

Attached is supportive material for:

1. BS Major in GEG
2. Minor in Geospatial Technology
3. Proposal to allow students to do a major in Geography and a minor in Geospatial Technology

At a later date, we will be submitting paperwork for changing the numbers of just about every course in the Department. We will also be introducing several new courses.

Also, as an FYI (because none of this need go through the Curriculum Committee), we will be:

4. Changing the requirements for the existing BA in Geography
5. Changing the requirements for the existing minor in Geography

## Memorandum

To: College of Arts and Sciences Curriculum Committee

From: Department of Geography (Ira Sheskin, Chair)

Date: March 25, 2015

RE: Curricular changes in the Department of Geography

Attached for the consideration of the College Curriculum Committee is supportive material for a proposed:

1. BS in Geography
2. Minor in Geospatial Technology

Early next year, Geography will be submitting numerous forms to the College Curriculum Committee to update course numbers, names, and descriptions of many of our courses. This will allow us to realign course sequences with our strengths and proposed offerings. We will also be introducing several new courses.

Also, as an FYI (because none of this need go through the College Curriculum Committee), we will be updating the requirements for the existing:

3. BA in Geography
4. Minor in Geography

## Proposal 1: The Bachelor of Science in Geography

Consistent with offerings at many American universities, the Geography Department would like to repackage and rebrand its current curricula and offer a BS in Geography.

### Rationale

Geography is a social and natural science which has become an increasingly technical field, led by rapid technological developments in Geographic Information Systems (GIS) and Remote Sensing (RS). Many geographers work in the area of human-environment interactions (conservation, ecology), and other physical geography sub-disciplines such as climatology and biogeography. GIS/RS technology has emerged not only as a driver of these fields, but also of traditional human geography sub-disciplines such as health, economic, and political geography. Dr. Mona Domosh, the current President of the Association of American Geographers, recently highlighted that more than 50% of departments offering Geography bachelor's and master's degrees offer a BS/MS with an emphasis in Physical Geography and/or GIS (our proposed BS emphasizes GIS; see Appendix A, *Geography and STEM*). Note that NSF continues to include Geography in its list of disciplines eligible for STEM funding.

The Department of Geography and Regional Studies currently offers a 30-credit BA degree and a 15-credit undergraduate certificate in Geospatial Technology (GT). All 15 credits from the Certificate may also be applied to the major. A recent internal review of our curricula revealed that the typical program of study for students completing our major and certificate concurrently is nearly identical to that of students completing a BS degree in Geography at other strong institutions. A review of the top 20 institutions from the 2012 NRC Geography Program Rankings (see Table 1) reveals that 11 offer the BS degree (12 offer a MS and 14 offer a BS and/or a MS). We also identified 6 universities that either have comparable departments, or are located in Florida, and 4 offer the BS (5 offer an MS and all 6 offer a BS and/or an MS). Thus this proposal for a BS in Geography serves to catch up with what most mainstream departments have been offering for years.

Graduates with strong GIS/RS technical skills encounter a wide variety of career options, as businesses and governments race to take advantage of technological advances. If students wish to enter the public sector, they may work in areas such as public administration and policy analysis; public safety, criminology and emergency preparedness management; public health; environmental management; or urban, regional, social service and transportation planning. Businesses also recruit GIS graduates, especially those focused on location analysis; global logistics and real estate; resource exploration and other topical areas. The BS degree should attract additional students to our department and will give our graduates an additional competitive advantage in a dynamic, competitive GIS job market.

## Resource Requirements

No new resources are necessary. GEG is already supporting all the required courses for a BS in Geography, as these mirror the existing GT certificate program requirements. GEG will also have a new assistant professor starting in Fall 2015 (from a top GIS program) who will contribute additional curricula. The only substantive difference is that students will have to complete the University-wide math and natural science requirements for the BS degree.

### The BS Degree Requirements (Table 2)

1. The BS degree requires 33 credits in Geography in addition to the University-wide math and natural science requirements for a BS degree.
2. The following courses are required:
  - GEG 101: Digital Earth
  - GEG 120: Physical Geography
  - GEG 199: Introduction to Geographic Information Systems
  - GEG 391: Intermediate Geographic Information Systems
  - GEG 392: Remote Sensing of the Environment
  - GEG 501: Capstone Course
3. A minimum of two courses are required from the following:
  - GEG 481: Introduction to Quantitative Methods
  - GEG 491: Geographic Information Systems and Environmental Modelling
  - GEG 595: Web Geographic Information Systems
  - GEG 681: Advanced Spatial Statistics
  - Other Advanced technical courses approved by Undergraduate Advisor
4. 9 credits of GEG electives
5. As a second major: 27 credits with course requirements as noted above, exclusive of GEG 120 (though this may count as an elective), and 6 credits of GEG electives instead of 9.

**Table 2** also shows how the BS degree would differ from the current and the soon-to-be-updated BA, which will appear in the 2015-2016 UM Bulletin.

### Comparison Programs for the BS in Geography

Many Top-20 Geography Departments are double or triple the size of UM Geography, and therefore not always fair comparisons in terms of the number of courses and requirements we can support. A number of smaller, more comparable departments support a BS degree in Geography as well, and we link you to a mix of comparison programs below.

[University of South Carolina, BS in Geography](#)

[University of New Mexico, BS in Geography](#)

[University of Arizona, BS in Geography](#)

[George Mason University, BS in Geography](#)

[University of Wisconsin, BS in in Cartography and Geographic Information Systems](#)

[University of Texas, Dallas, BS in Geospatial Information Sciences](#)

## **Proposal 2: Minor in Geospatial Technology**

Consistent with offerings at many American universities, the Geography Department would like to offer a Minor in Geospatial Technology.

### **Rationale**

Currently, the Department of Geography offers both an undergraduate and graduate Certificate in Geospatial Technology (GT). Unlike the graduate GT Certificate, the undergraduate GT Certificate does not generate revenue for the University and was originally created to provide a means to enroll working professionals from the information technology field who had not previously completed a BA, and thus were ineligible for the graduate GT Certificate.

The undergraduate GT Certificate has also been marketed to matriculated undergraduates. It has become popular among GEG majors as it allows students to earn the 15-credit Certificate and apply all of those 15 credits toward their 30-credit GEG major. It has also been popular for students from a variety of other STEM and social science programs ranging from Ecosystems Science and Civil Engineering to International Studies and Public Health.

Generally speaking, at most universities the chief difference between minors and certificates is that a minor is focused on a specific discipline whereas a certificate is usually interdisciplinary. We also believe that a minor may be considered by some to be more "academic" than a certificate, as certificates are often associated with continuing education (as is our graduate Certificate) and post-baccalaureate or non-matriculated study.

Thus, we propose converting our existing undergraduate GT certificate into a Minor in GT. Student majoring in fields that regularly employ geospatial technology, such as criminal justice, environmental science, or public health, and who are not concerned with double-counting the credits for the GEG Major, could now earn a GT Minor instead of the GT Certificate. Given current enrollments, this would double the number of minors in GEG, and serve as an attractive feeder program for the proposed BS in Geography described above, and our BA program.

This plan would not require us to discontinue offering the undergraduate GT Certificate, but for consistency, GEG and other advising offices would steer interested students to the GT Minor and gradually phase out the granting of Certificates to matriculated undergraduates. The undergraduate GT Certificate would stay on the books for the original purpose described above.

Given the various paths of study within the GEG major, we also acknowledge that students may, given current College rules, be able to pursue a major in Geography and minor in GT, with a maximum of 6 credits double-counting between them. [This is analogous to a student majoring in Sociology with a minor in Criminology, even though they are in the same department.] This is plausible for a GEG student who does not want to (or cannot, due to schedule constraints) complete the math and natural science requirements for the BS degree, but still completes the required coursework for a BA in Geography and Minor in GT.

### **GT Minors at Other Universities (Table 1)**

Of the Top 20 Institutions from the 2012 NRC Geography Program Rankings, 8 offer a Geospatial Minor. We also selected 6 universities we believe are somewhat comparable institutions, and 2 offer the Geospatial Minor.

### **The Minor in Geospatial Technology Requirements (Table 2)**

1. The Minor in Geospatial Technology degree requires 18 credits.
2. The following courses are required:
  - Any 100-level Geography course (in addition to GEG 199)
  - GEG 199: Introduction to Geographic Information Systems
  - GEG 391: Intermediate Geographic Information Systems
  - GEG 392: Remote Sensing of the Environment
3. At least one course is required from the following:
  - GEG 481: Introduction to Quantitative Methods
  - GEG 491: Geographic Information Systems and Environmental Modeling
  - GEG 595: Web Geographic Information Systems
  - GEG 681: Intermediate Spatial Statistics (undergraduate number TBD)
  - Other Advanced technical courses approved by the Undergraduate Advisor
4. 3 credits of electives in Geography at the 200-level or above

Note that we will continue to offer the 15-credit minor in Geography for students interested in non-technical Geography coursework in core departmental themes such as the environment, human health, and geopolitics.



Table 1. Select curricular characteristics of the top twenty institutions from the 2012 NRC Geography Program Rankings (see U.S. National Research Council's survey of doctoral programs) and other comparable institutions as of August 2014.

Institution	Dept Name	Academic Programs Offered						
		BA	BS	GISMinor	MA	MS	PhD	Grad GIS Cert
1. Boston University	Dept of Earth & Environmental Sciences	x <sup>1</sup>		x <sup>2</sup>	x*		x	
2. University of Colorado	Dept of Geography	x			x		x	
3. University of Maryland – College Park	Dept of Geographical Sciences	x		x <sup>3</sup>	x*	x <sup>4</sup>	x	x
4. University of California – Los Angeles	Dept of Geography	x		x <sup>5</sup>	x*		x	
5. Penn State University	Dept of Geography	x	x	x		x <sup>6</sup>	x	
6. University of Oregon	Dept of Geography	x	x		x	x	x	
7. Clark University	Dept of Geography; International Development, Community, and Environment; Graduate School of Geography	x			x	x <sup>7</sup>	x	
8. University of South Carolina – Columbia	Dept of Geography	x	x		x	x	x	
9. University of California – Santa Barbara	Dept of Geography	x	x		x <sup>8</sup>		x	
10. University of Wisconsin – Madison	Dept of Geography	x	x			x <sup>9</sup>		x
11. Ohio State University	Dept of Geography	x	x <sup>10</sup>	x <sup>11</sup>	x		x	
12. Arizona State University	School of Geographical Sciences and Urban Planning <sup>12</sup>	x	x <sup>13</sup>	x <sup>14</sup>	x	x <sup>15</sup>	x	x
13. University of California – Davis	The Geography Graduate Group				x		x	
14. University of Illinois at Urbana-Champaign	Dept of Geography and Geographic Information Science	x <sup>16</sup>		x <sup>17</sup>	x	x	x	
15. University of Kentucky	Dept of Geography	x	x		x		x	
16. University of Southern California	USC Spatial Sciences Institute		x <sup>18</sup>	x <sup>19</sup>		x <sup>20</sup>		x <sup>21</sup>

<sup>1</sup> No explicit GIS/GIScience track or major, but offers a BA/MA in Environmental Remote Sensing & GIS

<sup>2</sup> Offers 5 thematic minors, one of which is the Minor in Environmental Remote Sensing & GIS

<sup>3</sup> Separate minors in Geographic Information Systems and Remote Sensing of Environmental Change

<sup>4</sup> Master of Professional Studies in Geospatial Information Sciences

<sup>5</sup> Minors: Geography, Geography/Environmental Studies, Geospatial Information Systems and Technologies (GIS&T)

<sup>6</sup> Offers both the traditional MS and the online M.GIS degree

<sup>7</sup> Accelerated BA/MS Program in Geographic Information Science (program converted from MA to MS in July 2014)

<sup>8</sup> Preference for those enrolling in the PhD program

<sup>9</sup> Offers both the MS in Geography and the MS in Cartography/GIS

<sup>10</sup> There's even a GIS Major option as of 2012

<sup>11</sup> Four Minor specializations offered: Environment & Society; Atmospheric & Climatic Studies; GIS & Spatial Analysis; Urban, Regional & Global Studies

<sup>12</sup> Launching updated course numbers and degree information in Fall 2014

<sup>13</sup> BS in Geographic Information Science

<sup>14</sup> No GIS-specific minor, but offers a 19-unit undergraduate certificate in Geographic Information Science that can be paired with the BS degree

<sup>15</sup> Masters of Advanced Study (MAS) in Geographic Information Systems

<sup>16</sup> Not clear from web site if it's a BA or BS, but the degree name is now Geography and Geographic Information Science (as of Winter 2013)

<sup>17</sup> A hybrid minor called Minor in Geography & GIScience

17. University of Arizona	School of Geography and Development	x	x	x <sup>22</sup>	x	x <sup>23</sup>	x	x
18. Oregon State University	Dept of Geography, Environmental Sciences, and Marine Resource Management			x <sup>24</sup>	x	x	x	x
19. Syracuse University	Dept of Geography	x			x		x	
20. State University of New York at Buffalo	Dept of Geography	x			x	x	x	x
<i>Other Comparables</i>								
San Diego State University	Dept of Geography	x	x		x	x	x <sup>25</sup>	x <sup>26</sup>
University of New Mexico	Dept of Geography & Environmental Studies	x	x			x		
George Mason University	Dept of Geography and Geoinformation Science	x	x	x <sup>27</sup>		x	x <sup>28</sup>	x <sup>29,30</sup>
George Washington University	Dept of Geography	x		x	x			x
Florida State University	Dept of Geography	x			x	x	x	
University of Florida	Dept of Geography	x	x		x	x	x	

\* Not a formal Master's program, i.e. normally conferred in lieu of successful completion of the Ph.D.

<sup>18</sup> BS in GeoDesign

<sup>19</sup> Minor in Spatial Studies

<sup>20</sup> MS in Geographic Information Science & Technology

<sup>21</sup> Three Graduate Certificate options: Geographic Information Science & Technology; Geospatial Intelligence; Geospatial Leadership

<sup>22</sup> 6 courses, 4 required + 2 electives

<sup>23</sup> MS in Geographic Information Systems Technology

<sup>24</sup> The Earth Sciences Program offers BS degrees with options in Geography, Geology, and Ocean Science

<sup>25</sup> Joint program with UCSB

<sup>26</sup> Jointly administered by the Departments of Geography and Computer Science

<sup>27</sup> Geography Minor will be available as a Fully Online Program as of Summer 2014

<sup>28</sup> PhD in Earth Systems & Geoinformation Sciences

<sup>29</sup> Three Graduate Certificate options: Geospatial Intelligence; Geographic Information Sciences; Remote Sensing

<sup>30</sup> Geospatial Intelligence Graduate Certificate will be available as a Fully Online Program as of Spring 2015

Table 2. Current and proposed GEG offerings; all require a minimum grade of C- for credit toward major/minor and minimum major/minor GPA of 2.00.

Current B.A.	Proposed B.A. in Geography	Proposed B.S. in Geography	Proposed Minor in Geography	Proposed Minor in Geospatial Technology
<i>As First Major</i>				
30 credits	30 credits	33 credits	15 credits	18 credits
Required courses: (12 credits) -3 100-level courses -Capstone	Required courses: (9 credits) -Digital Earth -At least 1 course from: Physical Geography Human Geography World Regional Geography -Capstone (3 credits) <sup>a</sup>	Required courses: (24 credits) -Digital Earth -Physical Geography -Intro to GIS -Intermediate GIS -Intro to Remote Sensing -At least 2 courses from: Web GIS GIS & Envir Modeling Intro to Statistics (or equiv) Adv Spatial Statistics Other advanced technical courses (w/ dept approval) -Capstone (3 credits) <sup>a</sup>	Required courses: -Any 100-level course	Required courses: -Any 100-level course -Intro to GIS -Intermediate GIS -Intro to Remote Sensing -At least 1 course from: Cartography Web GIS GIS & Envir Modeling Intro to Statistics (or equiv) Adv Spatial Statistics Other advanced technical courses (w/ dept approval)
Electives: 18 credits	Electives: 21 credits, at least 3 courses (minimum 9 credits total) at the 300-level or above, exclusive of Capstone	Electives: 9 credits	At least 2 courses (minimum 6 credits total) at the 300-level or above	Electives: 3 credits at the 200-level or above
		University requirements: -2-course math sequence -1 course in Natural Sci from Bio, Chem, Geol, or Phys.		
<i>As Second Major</i>				
24 credits	24 credits	27 credits	N/A	N/A
Required courses: -2 100-level courses -Capstone Electives: 15 credits	Same as above but with 15 elective credits	Same as above but with 6 elective credits and no Physical Geography req (may still serve as elective)		

<sup>a</sup> **Capstone** – The 3-credit Capstone Research Seminar is designed to provide students with real-world work or field experience in the field of geography. This experience fosters a collaborative research setting for undergraduates to work on projects of personal interest as a taste of graduate school while interacting with a small group of peers. The Capstone encourages fieldwork (if feasible) and is geared toward providing the student with an opportunity to apply geographic theory and acquired skills to local, national, and international problems with the goal of producing a professional-quality work product. Students are encouraged to structure their Capstone in such a way that supports their academic and professional portfolios as they prepare for academic programs (i.e. a publishable manuscript) or the professional job market (a technical report, multimedia product, or other product).