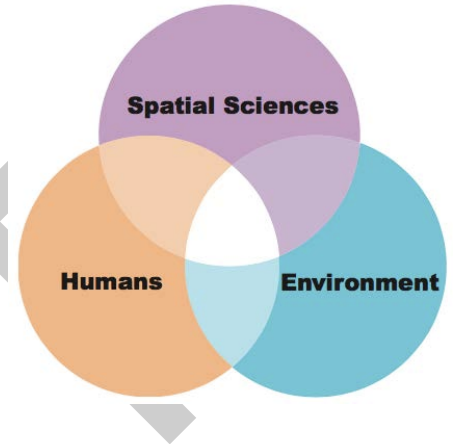


# University of Wyoming Geography

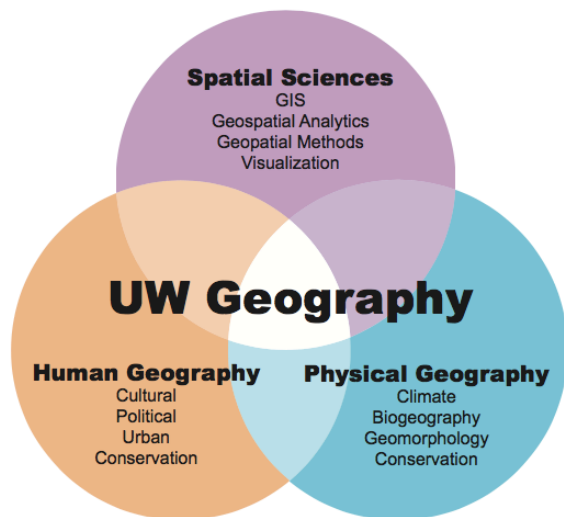


## Roadmap to the Future: A draft presented to the Steering Committee for the proposed “School of Spatial Sciences



**University of Wyoming Geography** provides a holistic education in environment, society, and technology that integrates studies of the connections we have to each other and the world by utilizing geospatial techniques and approaches. We promote this approach to interdisciplinary research and teaching in an increasingly connected world shaped by rapid environmental and technological changes. The ability to understand changing global connections is crucial for students today as they prepare for the challenges of tomorrow. UW Geography is a home for this kind of learning, incorporating spatial perspectives, analyses and techniques in the context of environment, society and economics in an active-learning framework. Interdisciplinary training in geography and spatial sciences **empowers** students to explore this interconnectivity directly. Our faculty have expertise in *cultural geography, political geography, climatology, geovisualization, geospatial analysis, big data science, GIS, planning, environmental change, biogeography, and conservation*. We work throughout the nation and internationally on a wide range of issues, from drivers of conflict and social change to drivers of drought and ecosystem

change. Our students work with an engaged and dynamic group of faculty who nurture them to develop and use spatial knowledge and skills to inform solutions for 21<sup>st</sup> century challenges.



University of Wyoming Geography plays an integral role on campus and throughout the state of Wyoming with research, education and outreach focused on spatial sciences and human-environment interactions (Figure 1). With a relatively constant number of more than 75 majors since 2015, Geography offers BS, BA and MA degrees, as well as a MA in Planning. The Geography curriculum includes strong interdisciplinary components with more than 15 cross-listed courses supporting a wide range of

Figure 1- Geography foundational concepts

UW intellectual communities. Based on an external review in 2015, the Geography Department is in good standing with strong interdisciplinary connections across campus (provided below). We are well positioned to maintain those connections while playing an important role in the development of the proposed Spatial Sciences Initiative (SSI).

The primary goal of the faculty in the Geography department is to maintain the capacity to offer undergraduate (BS and BA) and graduate (MA) degree in Geography and a graduate (MA) degree in Planning while simultaneously supporting the breadth, depth and interdisciplinary nature of Geography and the Spatial Sciences at UW. This goal will contribute to UW Strategic Plan Goals that describe the importance of interdisciplinary scholarship, innovation, and diversity to promote a sustainable future. An overview of the Geography curriculum is provided at the end of this document. Changes to the Geography curriculum will be coordinated with and respond to ongoing work within the Geospatial Curriculum Subcommittee. Here we discuss a future for the department of Geography to best contribute to the SSI and help advance the skills of geospatial thinking at the University.

### **Current Strengths of UW Geography**

UW Geography program has seen a relatively stable enrollment of ~75 students in the BA, BS & MA programs. The ability of the faculty to provide a diverse curriculum is a testament to the breadth of training Geography degrees provide, but the need to maintain a consistent curriculum is in need of structural support. Faculty have been willing to stretch beyond their subject matter specialties so that students are broadly trained in the discipline. The department also plays a significant role in interdisciplinary and cross disciplinary education through support of other programs and cross-listed courses. This curriculum supports UW Strategic Goal 1 – Building Excellence – by fostering interdisciplinary teaching and active learning that address urgent spatial issues that support local, regional and global issues of societal concerns – Internet GIS, Global Cities, Conservation of Natural Resources, Water Resources, Climate, Geography of Conflicts, Environmental Change, Spatial analytics of social data.

UW Geography has always had strong teaching and research linkages with WyGIS, evidenced by the fact that the department is the home unit for most of the Academic Professional faculty at WyGIS. This linkage allows for the department to have diversity in its geospatial curriculum. Modern society relies upon geospatial technologies (e.g. Google Earth, GPS, location-based information and communication technology, and spatialized social media) and those technologies are not monolithic and our curriculum reflects that as well. Geography provides the contextual implementation framework for geospatial technologies to **empower** linkages between environment, society, and technology. Accessible and interdisciplinary geographical training allows individuals the flexibility to think across a variety of spatial scales creating well-rounded global citizens in support of UW Strategic Goal 2 – Inspiring Students.

UW Geography outreach is significant to the state of Wyoming and strengthens UW Strategic Goal 3 – Impacting Communities. Our Planning Program has produced most of the city planners in Wyoming. We also help coordinate the Wyoming Geographic Alliance (WGA) whose activities include the Geography Bee, traveling maps, student atlas, and summer geospatial workshops for k-12 teachers. Geography is an important component of k-12 education in most states, and, although Wyoming is currently the only state without Advance Placement (AP) Geography, UW Geography has been working on bringing this curriculum to the state. For

example, the k-12 curriculum will soon include AP GIS. Through WyGISC our faculty manage the Wyoming Geospatial Hub (geospatialhub.org) – a statewide clearing house with global access that consolidates a wide variety of geospatial data with a focus on Wyoming. Further, WyGISC provides geospatial support for state and federal agencies on a variety of research, monitoring, and planning projects. We also host the UW chapter of Gamma Theta Upsilon, the International Geographical Honor Society. Together, the Geography Department, WyGISC, WGA, Gamma Theta Upsilon, and the Multicultural Association of Student Scientists (MASS) organized a week of speakers and events in support of Geography Awareness Week.

### **Vision toward the Future**

As UW Geography looks at the future we recognize our niche on campus lies at the intersection of *Environment and Society*. This intersection is at the core of *Geographic Thinking* and reflects the motivation for the development and application of geospatial technologies to global issues, starting with the map and expanding to technologies carried on mobile devices. Geospatial data are ubiquitous in society, with estimates that 80% of all information contains geographic references. The evolution of computational technologies (e.g., cloud computing and machine learning) has enabled leveraging these massive amounts of data for location-based decision-making.

With the Spatial Science Initiative, UW Geography has the opportunity to better support *Geographic Thinking* in the application of geospatial technologies to complex, real-world issues. The current Geography curriculum (below) is designed to create a holistic geographic education for students by exposing them to global issues surrounding society, natural resources and the physical world and giving them robust geospatial skill sets to analyze these issues through computational methodologies, like GIS and remote sensing. Rebranding and expanding our curriculum by utilizing campus resources across colleges can create positive additions to what has been traditionally offered to students. Even after the retirements in 2018, the remaining Tenure-Track geography faculty represent major sub-fields of Geography and will be able to maintain the curriculum during the transition. Future hires will need to contribute subject-matter and technical (geospatial) expertise consistent with both the Spatial Science Initiative and national trends in Geography and in support of UW Strategic Goal 4.

UW Geography has the opportunity to create a flexible curriculum for students at UW that *empowers* the Spatial Sciences Initiative by optimizing opportunities for training in Environmental and Societal contextualized spatial thinking (i.e. *Geographic Thinking*) across the University. While we are proud that the department is an interdisciplinary and cross-disciplinary hub, UW Geography has often not leveraged courses across the college or University that are geographic in nature or even specifically taught by trained geographers and could be part of a geographic curriculum. With a small faculty, disciplinary silos are not warranted and do not serve the Spatial Sciences Initiative or Geographic Thinking across campus. We envision a future for UW Geography that is more inclusive and better promotes the collaborations we are proud of.

UW Geography proposes that all degrees offered can be served through a program model, similar to Life, ESS and ENR. In this model we may continue to offer much of current curriculum as listed in the General Bulletin, but with an active curriculum review committee we can track those faculty who can formally or informally be affiliated with our program and the

courses they are offering over the next few years. By casting our curriculum net across campus we would be able to identify those faculty and courses that support the degrees offered in Geography and Planning. Currently, we have faculty in Geography, Public Administration, and Agricultural and Applied Economics whose courses can support the MA in Planning. Similarly, Geology and Geophysics, ESM, Anthropology, Global and Area Studies, American Studies, and Political Sciences all have faculty who have courses that would add to a *curriculum that focusses on Environment and Society*.

The programmatic model utilizes the existing cross-University connections that include:

*Curriculum:* Education, ENR, ESS, International Studies, WARE

*Committee membership:* Agricultural and Applied Economics, Anthropology, Atmospheric Sciences, ENR, ESM, ESS, Geology and Geophysics, Global Studies, Law, PiE, WARE, WRESE, Zoology

*Collaboration:* Agriculture and Applied Economics, American Studies, Anthropology, Art and Art History, Computer Science, Communication and Journalism, ENR, Geology and Geophysics, History, International Studies, Latina/o Studies, Modern & Classical Languages (Spanish), Multicultural Association of Student Scientists, Science Initiative, Shell 3D Visualization Center, Social Justice Research Center, UW McNair Scholars Program, Water Resources Data System (WRDS), Wyoming Cooperative Fish and Wildlife Unit, Wyoming Geographic Alliance, WyGIS, Wyoming Institute for Humanities Research, Women in Math Science and Engineering

### **Postscript**

For over 50 years UW Geography has been administered under the College of Arts and Sciences. In that time the program has grown to include Recreation and Tourism and Planning. We have also been the academic home for many of the faculty and staff of WyGIS. Currently, the department has contracted to include Planning and a continued strong relationship to WyGIS, whose personnel account for 60% of the GIS and Spatial Science curriculum in the department. The department has long cultivated interdisciplinary inquiry with cross-university collaboration with units such as American Studies, American Indian Studies, Global and Area Studies, the Water Center, WyCEHG, and the Haub School of Environmental and Natural Resources. Collaboration across campus has been intellectual and academic as many of the units affiliated with UW Geography have trained geographers on their faculty. The result is a diffusion of geographic expertise across campus and a dilution of resources needed for the maintenance of a core Geography Department.

For UW Geography to succeed and support the Spatial Science Initiative the Geography faculty need an academic home in a department, school or college that supports faculty efforts to rebuild and grow the University of Wyoming's geospatial curriculum. While uncertainty is a roadblock to success as it affects the existing faculty and recruitment of future faculty to join this effort, we are committed to a broader vision for the department that focusses on linkages between Environment and Society and Spatial Science and in the context of Geographic Thinking at UW.

## **Current Geography Curriculum: An Overview**

**Geography degree: 40 credits**

**Foundation: 16 credits required;**

**Content areas: 24 credits total across three areas:**

- 1. Geospatial/GIS;**
- 2. Physical Geography/Natural Resources; and**
- 3. Human Geography**

**At least two courses in two content areas and at least one course in one content area. \*Course offerings vary by semester.**



### **FOUNDATION (16 CREDITS, REQUIRED)**

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- GEOG 1000, Human Geography (3)
- GEOG 1020, World Regional Geography (3)
- GEOG 1010, Landscape and Water (3)
- GEOG 1011, Climate and Biosphere (3)
- GEOG 2150, Foundations of GIS and Technology (4)

### **CONTENT AREAS:**

#### **1. GEOSPATIAL/GIS (AT LEAST 3-8 CREDITS)**

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- GEOG 3150, Survey of Remote Sensing Applications (3)
- GEOG 3280, Spatial Methods (4)
- GEOG 4000, Terrain Analysis (3)
- GEOG 4111, Remote Sensing of the Environment (4)
- GEOG 4113, Geological Remote Sensing (4)
- GEOG 4200, Introduction to Geographic Information Systems (4)
- GEOG 4210, Advanced Geographic Information Systems (4)
- GEOG 4211, Advanced Remote Sensing of the Environment (4)
- GEOG 4220, Spatial Modeling and Geocomputation (4)

## 2. PHYSICAL GEOGRAPHY/NATURAL RESOURCES (AT LEAST 3-8 CREDITS)

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GEOG 3010, Geomorphology of Earth's Dynamic Landscapes (3)  
GEOG 3450, Weather and Climate (3)  
GEOG 3480, Environmental Change (3)  
GEOG 3550, Natural Hazards and Society (3)  
GEOG 4040, Conservation of Natural Resources (3)  
GEOG 4051, Environmental Politics (3)  
GEOG 4440, Advanced Global Climate Variability (3)  
GEOG 4450, Fluvial Geomorphology (4)  
GEOG 4460, Biogeography (3)  
GEOG 4470, Fire Ecology (3)

## 3. HUMAN GEOGRAPHY (AT LEAST 3-6 CREDITS)

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GEOG 2370, Chicano History: Origins to 1900. (3)  
GEOG 3030, Geography and Development (3)  
GEOG 3550, Natural Hazards and Society (3)  
GEOG 3050, Economic Geography (3)  
GEOG 3400, Traditional Ecological Knowledge (3)  
GEOG 4013, Political Geography (3)  
GEOG 4020, Geography and Tourism (3)  
GEOG 4051, Environmental Politics (3)  
GEOG 4500, The American Landscape (3)  
GEOG 4502, Images of Wyoming and the West (3)  
GEOG 4550, Geography of Wine (3)  
GEOG 4560, Global Cities (3)  
GEOG 4570, Cultural Geography (3)  
GEOG 4580, Sense of Place (3)  
GEOG 4590, Geography of Conflicts (3)

# **Geography Interdisciplinary Connections: An Overview**

## **Curriculum:**

Education  
ESS  
ENR  
International Studies  
WARE

## **Committee membership:**

Agriculture and Applied Economics  
Anthropology  
Atmospheric Sciences  
ESS  
ENR  
ESM  
Geology and Geophysics  
Global and Area Studies/International Studies  
Law  
PiE  
WARE  
WRESE  
Zoology

## **Collaboration:**

Agricultural and Applied Economics  
American Studies  
Anthropology  
Art Department  
Computer Science  
Communication and Journalism  
ENR  
Geology  
History  
International Studies  
Latina/o Studies  
Modern & Classical Languages (Spanish)  
Multicultural Association of Student Scientists  
Science Initiative  
Shell 3D Visualization Center  
Social Justice Research Center  
UW McNair Scholars Program  
Water Resources Data System (WRDS)  
Wyoming Cooperative Fish and Wildlife Unit  
Wyoming Geographic Alliance  
WyGIS

DRAFT



# Geography Strategic Planning



## Unit Goals

- 1A. Enhance national exposure and ranking of Wyoming Geography through a strengthened graduate and undergraduate programs through increased TA and GA lines from internal and external funding (graduates) and paid internships and research assistantships (undergraduates). Continued recruitment of graduate students should sustain at ~7/year growing to 10 with increased exposure. Increase capacity in instruction of geospatial methodologies with scholars from diverse subject matter experts (SME)
- Continue efforts for external and internal funding for research and creative activities through National, International research organizations and foundations to emphasize geographic analyses of human and natural systems
  - Promote outreach of geographic knowledge to Wyoming Schools to increase regional students interested in the spatial relationships
  - Support regional to international opportunities for undergraduate and graduate student to conduct and present independent research
  - Increase faculty capacity through strategic hires emphasizing SME in human-environment relations and physical geography and application of geospatial methodologies to their topical expertise
- 1B. UW Geography will look to increase interdisciplinary connections across campus. Some efforts include a targeted Minor of Civil Engineer for students focused on spatial science; reconnect with secondary education through Human Geography offerings, which supports AP Geography in K-12 curriculum. Help establish AP Geography in Wyoming.
- Improve visibility across campus and the state through social media outreach and events (Geography Awareness Week, State Geography Bee participation)
  - Continue participation in Saturday University
  - Continue curation of curriculum to enhance foundations of geographic though linking human-environment interaction through critical thinking and spatial analyses
  - Enhance training in in geospatial technologies and understanding
- 1C. Increase international faculty exchange and sponsorship. Improve and enhance distance learning opportunities for across the state, nationally, and internationally. Support centers of excellence through continued focuses on biodiversity, resource conservation and human and physical geography of the West. Support Spatial Science Initiative.
- Formalize program for hosting sabbatical scholars and in department residences to bring global perspective and scholarship to University and students
  - Outreach through the 150<sup>th</sup> anniversary of the John Wesley Powell project (2018-2021) incorporating faculty from Geography, Art, Law, American Heritage Center and ENR
- 1D. Assessment and improvement of graduate and undergraduate curriculum through exit interviews (upon graduation) and graduation rates from when students enter program.

Current curricular changes made in past two years, the dropping of concentrations so student could customize their education goals, should be assessed in next 1-2 years to understand student satisfaction and time to graduation.

- Evaluate graduate offerings
- Align cross-listing of senior/graduate listing for all 4000 level courses as appropriate
- Continue development of on-line courses, assess that rigor of in-class and online are equated
- Consider APL as coordinator of Geography and Spatial Science curriculum, administer online courses and contribute to on campus instruction
- Develop place-based education on Wyoming's culture and natural environment
- Refocus GIS Certificate for professional development of students

2A. MA Graduate Recruitment is currently international and should continue. Work is needed in the branding of the department through the website and should emphasize faculty capacity and interest. Individual faculty websites should also welcome qualified students from all backgrounds. Department focus in recruitment should focus for improving scholarship with the discipline, creating professional training for the geospatial workforce and launching students to excel in PhD programs on campus and nationally.

- Promote mentoring opportunities for graduate students as part of professional development
- Identify outreach opportunities to get geographers in the schools
- Develop place-based outreach course to improve linkages across the state to the department.
- Identify a source for summer funding for graduate students

2B. Geography should continue to work with McNair scholars to increase diversity in the discipline and department. Incorporating diverse undergraduates into research groups provides mentoring opportunities for graduates as part of professional development.

- Mentor students to engage in academic endeavors such as conferences, research presentations, publications
- Identify and encourage application to national and international opportunities (UN, US Govt., NGOs) to apply their geographic knowledge to global issues
- Promote application to funding agencies that support graduate studies such as NSF Graduate Fellows
  - Link current students to UW Geography alumni who have succeeded in these arenas.

2C. UW Geography has alumni who have entered government, industry and NGOs. Identify internship pathways for current students looking for professional development through an alumni network. Put this ask on the department website and personal letters to alumni.

- Establish sources for external internships
- Incorporate undergraduates into research groups as part of summer interships to increase student-faculty interaction

3A. UW Geography needs to emerge from the background and engage in greater promotion of the work conducted by faculty and students. Enhancing web material is not enough. Media

contacts and continued engagement with Saturday University and other public events. The department should make better use of campus media.

- Focus on university in-reach through campus communications
- Look at web “identity” and examine ways of improvement
- Guest lecture as opportunities present themselves
- Establish linkage with state media and contact sources to, let them know of department research activities.

3B. Work across the state to get AP Geography and GIST into K-12 curriculum. Develop place-based curriculum.

- Strengthen geographic knowledge throughout Wyoming.
- Digitize Wyoming Atlas for K-12 curriculum
- Use relationships with other departments programs and Centers to develop geographic perspectives on place, environments and how we represent the perspectives graphically and spatially to create visual narratives.

3C. Develop an outreach plan to alumni.

- Homecoming events
- Look to alumni for a revenue stream
- Internship opportunities for current student
- Employment pipelines.

4A. Identify areas of excellence and hire subject matter experts that utilizes geospatial methodologies (GIST) in their research

- Human-environment relationships
- Community Development and Planning
- Geomorphology and terrain analysis
- Natural Resources
- The West