



**SOUTH DAKOTA BOARD OF REGENTS  
ACADEMIC AFFAIRS FORMS**

**New Specialization**

<b>UNIVERSITY:</b>	<b>SDSU</b>
<b>TITLE OF PROPOSED SPECIALIZATION:</b>	<b>Geography</b>
<b>NAME OF DEGREE PROGRAM IN WHICH SPECIALIZATION IS OFFERED:</b>	<b>Geospatial Science &amp; Engineering (Ph.D.)</b>
<b>INTENDED DATE OF IMPLEMENTATION:</b>	<b>2019-2020 Academic Year</b>
<b>PROPOSED CIP CODE:</b>	<b>45.0702</b>
<b>UNIVERSITY DEPARTMENT:</b>	<b>Geography</b>
<b>UNIVERSITY DIVISION:</b>	<b>Graduate School</b>

**University Approval**

*To the Board of Regents and the Executive Director: I certify that I have read this proposal, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.*

5/13/2019

Institutional Approval Signature

Date

*President or Chief Academic Officer of the University*

**1. Level of the Specialization:**

Baccalaureate     Master's     Doctoral

**2. What is the nature/purpose of the proposed specialization?**

South Dakota State University (SDSU) requests authorization to offer a specialization in Geography for the Ph.D. in Geospatial Science & Engineering. This request is in response to students' needs, market demands, and an ever-changing society. Geography is a discipline that lies at the intersection of the natural, social, and technological sciences, which means that it has tools and ideas, which can be applied to today's complex problems. For these reasons, geographers are comfortable working with scientists in other disciplines. Among the relevant problems that geographers are helping to solve include environmental, urban, and economic sustainability, social and environmental consequences of climate disruption, the preservation of biological diversity, impacts of globalization and migration, and food security, to name a few.<sup>1</sup> To better position itself to help solve these problems, the discipline has focused on interdisciplinary collaboration and specialization, bridging skills between social and physical scientists, and partnerships with appropriate stakeholders in private industry and government.

<sup>1</sup> National Research Council of the National Academies. 2010. *Understanding the Changing Planet: Strategic Directions for the Geographical Sciences*. Washington DC: The National Academies Press.

Thus, they require the knowledge of physical geography, human geography and/other disciplines to be fully implemented. All these, however, are facilitated through the use of geospatial techniques, which has been a major push in the discipline. These include Geographic Information Systems (GIS), remote sensing, cartography, global positioning systems (GPS), spatial statistics, and the use of other technologies, such as Unmanned Aerial Vehicles (UAVs) (a.k.a. drones). It is this push that links geospatial techniques and analyses with natural and social sciences to help solve relevant problems facing the world today, which is an internal force in the evolution of the discipline of geography. The Geography specialization prepares graduate students for careers in a wide range of geospatial information research and applications. A student completing this specialization will be prepared to take on environmental and social issues and problems with ability to apply advanced technical and leadership roles in federal, state and local agencies and firms employing GIS, remote sensing, and other geospatial technologies.

### **3. Provide a justification for the specialization, including the potential benefits to students and potential workforce demand for those who graduate with the credential.<sup>2</sup>**

Many projections from government agencies and market research firms alike point toward the need for trained geographers in the rapidly growing geospatial technology industry as well as growth in GIS-related employment sectors and fields. The U.S. Department of Labor Employment and Training Administration (DOLETA), for example, cites an annual growth rate of approximately 35 percent for the geospatial technology industry, with reliable public sector revenue accounting for approximately one third of the industry's total annual receipts.<sup>3</sup> Likewise, P&S Market Research estimates a compound annual growth rate of 10.1 percent from 2017 to 2023 for the global GIS market.<sup>4</sup>

A particular highlight is the field of cartography and photogrammetry. According to the U.S. Department of Labor's Bureau of Labor Statistics (BLS), jobs in the field of cartography and photogrammetry are expected to grow by approximately 19% between 2016 and 2026, with a total estimated growth of “much faster than the average” for all occupations over this same period. With a median salary over \$62,750, employment in jobs related to cartography and photogrammetry are excellent opportunities for recent university graduates who have GIS experience and specialization.<sup>5</sup>

In the last five years, many state agencies have incorporated geospatial technologies and have created new positions for geographers, geospatial analysts, technicians, programmers and managers. Some South Dakota agencies that employ persons with GIS training include the Department of Game, Fish and Parks, Department of Transportation, Department of Environment and Natural Resources, and Department of Public Safety to name a few. In addition, Native American tribal governments, city planning departments, and regional planning agencies have created new positions for geographers with GIS knowledge. Increasingly, there is a demand for geography professionals in private industry within South Dakota. Surveying and engineering firms

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<sup>2</sup> For workforce related information, please provide data and examples; data sources may include but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc.

<sup>3</sup>Employment and Training Administration, U.S. Department of Labor, *High Growth Industry Profile: Geospatial Technology*, on the internet [https://www.doleta.gov/brg/indprof/geospatial\\_profile.cfm](https://www.doleta.gov/brg/indprof/geospatial_profile.cfm) (visited February 2, 2018).

<sup>4</sup> P&S Marketing Research, on the internet at <https://www.psmarketresearch.com/press-release/global-geographic-information-system-market> (visited February 2, 2018).

<sup>5</sup> Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2017-18 Edition*, on the Internet at <https://www.bls.gov/ooh/architecture-and-engineering/cartographers-and-photogrammetrists.htm> (visited February 2, 2018).

throughout the state routinely hire geography professionals. EROS Data Center employs persons with remote sensing skills. A specialization in Geography in the Ph.D. in Geospatial Science & Engineering will provide advanced training for individuals working in public and private industries throughout the state of South Dakota, the region and the United States. The South Dakota Department of Labor & Regulation<sup>6</sup> and Bureau of Labor Statistics (BLS)<sup>7</sup> predict employment growth in many of these occupations.

**4. List the proposed curriculum for the specialization (including the requirements for completing the major – *highlight courses in the specialization*):**

The student, major advisor and Advisory Committee select the specific emphasis area in Geospatial Science & Engineering

Prefix	Number	Course Title	Credit Hours	New (yes, no)
<b>60 Credit Plan</b>				
GEOG	710	Evolution of Geographic Thought	3	No
GSE	740	Introduction to Geospatial Science and Engineering	3	No
GSE	790	Seminar in Geospatial Science and Engineering (1 cr.)	3	No
GSE	898	Dissertation Coursework	36	No
		<b>Specialization Coursework</b>	<b>6</b>	<b>No</b>
		Supporting Electives (Students should consult their advisors to identify courses suitable for their area of interest.)	9	No
<b>90 Credit Plan</b>				
GEOG	710	Evolution of Geographic Thought	3	No
GSE	740	Introduction to Geospatial Science and Engineering	3	No
GSE	790	Seminar in Geospatial Science and Engineering (1 cr.)	3	No
GSE	898	Dissertation Coursework	36	No
		<b>Specialization Coursework</b>	<b>6</b>	<b>No</b>
		Supporting Electives (Students should consult their advisors to identify courses suitable for their area of interest.)	39	No

Total number of hours required for completion of specialization

6
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Total number of hours required for completion of major

60/90
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Total number of hours required for completion of degree

60/90
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**5. Delivery Location<sup>8</sup>**

**A. Complete the following charts to indicate if the university seeks authorization to deliver the entire program on campus, at any off campus location (e.g., UC Sioux Falls, Capital University Center, Black Hills State University-Rapid City, etc.) or deliver the entire program through distance technology (e.g., as an on-line program)?**

<sup>6</sup> South Dakota Department of Labor and Regulations, *Employment Projections by Occupation*, on the internet at: <https://www.southdakotaworks.org> (visited February 2, 2018).

<sup>7</sup> Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2017-18 Edition*, on the Internet at <https://www.bls.gov/ooh> (visited February 2, 2018).

<sup>8</sup> The Higher Learning Commission (HLC) and Board of Regents policy requires approval for a university to offer programs off-campus and through distance delivery.

	Yes/No	Intended Start Date
On campus	Yes	2019-2020 Academic Year

	Yes/No	If Yes, list location(s)	Intended Start Date
Off campus	No		

	Yes/No	If Yes, identify delivery methods <sup>9</sup>	Intended Start Date
Distance Delivery (online/other distance delivery methods)	No		

**B. Complete the following chart to indicate if the university seeks authorization to deliver more than 50% but less than 100% of the certificate through distance learning (e.g., as an on-line program)?<sup>10</sup>**

	Yes/No	If Yes, identify delivery methods	Intended Start Date
Distance Delivery (online/other distance delivery methods)	No		

<sup>9</sup> Delivery methods are defined in [AAC Guideline 5.5](#).

<sup>10</sup> This question responds to HLC definitions for distance delivery.