

SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs
Consent

REVISED
AGENDA ITEM: 5 – C (4)
DATE: May 9, 2023

SUBJECT

New Undergraduate Certificate Request – SDSU – Geospatial Intelligence

CONTROLLING STATUTE, RULE, OR POLICY

[BOR Policy 2:23](#) – New Programs, Program Modifications, Curricular Requests, and Inactivation/Termination

BACKGROUND / DISCUSSION

South Dakota State University (SDSU) requests authorization to offer a graduate certificate in Geospatial Intelligence. Geospatial Intelligence refers to the use of geospatial technologies to extract information for the decision advantage in humanitarian response, strategic defense, security, or investigative analysis. The proposed certificate would focus on geospatial techniques (GIS, remote sensing, data management, etc.) and analytical courses to provide students with foundational knowledge in this area.

The proposed certificate would exceed the 12-credit hour limit for certificates, per AAC Guidelines. SDSU has been granted an exception for this 15-credit hour certificate, as the USGIF accreditation requirements stipulated that a graduate certificate must be 15 credits or more.

IMPACT AND RECOMMENDATION

SDSU plans to offer the Geospatial Intelligence certificate on campus and online. SDSU does not request new state resources. No new courses will be required.

Board office staff recommends approval.

ATTACHMENTS

Attachment I – New Certificate Request Form: SDSU – Geospatial Intelligence

DRAFT MOTION 20230509_5-C(4):

I move to authorize SDSU to offer a graduate certificate in Geospatial Intelligence, as presented.



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

New Certificate

UNIVERSITY:	SDSU
TITLE OF PROPOSED CERTIFICATE:	Geospatial Intelligence
INTENDED DATE OF IMPLEMENTATION:	Fall 2023
PROPOSED CIP CODE:	43.0407
UNIVERSITY DEPARTMENT:	Geography & Geospatial Sciences
BANNER DEPARTMENT CODE:	SGGS
UNIVERSITY DIVISION:	Natural Sciences
BANNER DIVISION CODE:	3T

Please check this box to confirm that:

- The individual preparing this request has read [AAC Guideline 2.7](#), which pertains to new certificate requests, and that this request meets the requirements outlined in the guidelines.
- This request will not be posted to the university website for review of the Academic Affairs Committee until it is approved by the Executive Director and Chief Academic Officer.

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.

David H. Dunn

Institutional Approval Signature

President or Chief Academic Officer of the University

4/3/2023

Date

1. Is this a graduate-level certificate or undergraduate-level certificate?

Undergraduate Certificate

Graduate Certificate

2. What is the nature/ purpose of the proposed certificate? Please include a brief (1-2 sentence) description of the academic field in this certificate.

South Dakota State University (SDSU) requests authorization to offer a graduate certificate in Geospatial Intelligence. Geospatial Intelligence refers to the use of geospatial technologies to extract information for decision advantage in humanitarian response, strategic defense, security, or investigative analysis. The proposed certificate would focus on geospatial techniques (GIS, remote sensing, data management, etc.) and analytical courses to provide students with foundational knowledge for success in the GEOINT community. This certificate would be open to all students with an interest in a credential for working in national security, emergency management, or public safety careers.

The United States Geospatial Intelligence Foundation (USGIF) mission is to promote the geospatial intelligence tradecraft, and to develop a stronger community of interest between government, industry, academia, professional organizations, and individuals who share a mission focused around the development and application of geospatial intelligence to address national security objectives. Toward this end, USGIF seeks to accomplish this mission using a variety of tactics including the accreditation of educational programs to promote the continuous growth of the Geospatial Intelligence (GEOINT) profession through education, professional development, and practice. USGIF aims is to support lifelong learning and professional development in the competencies associated with GEOINT, amplify GEOINT's impact in education, industry, and government, foster GEOINT exchanges and engagement, and help accelerate GEOINT teaching, research, and innovation. The proposed graduate certificate will fit within the USGIF's mission to advance the skills, competencies, and knowledge of students to work in the GEOINT field.

3. If you do not have a major in this field, explain how the proposed certificate relates to your university mission and strategic plan, and to the current Board of Regents Strategic Plan 2014-2020.

The proposed certificate fits within SDSU's statutory mission to provide undergraduate and graduate programs of instruction in the liberal arts and sciences. The Department of Geography and Geospatial Sciences currently offers undergraduate and graduate level programs in Geography (B.A., B.S., M.S., minor), Geographic Information Sciences (B.S., M.S. specialization, minor, certificate), Community and Regional Planning (B.S.), Geospatial Intelligence Minor, and Geospatial Science and Engineering (Ph.D.) - Geography and Remote Sensing Specializations. The Geospatial Intelligence Certificate will complement existing geography and geospatial sciences programs offered by SDSU.

The Geospatial Intelligence certificate will contribute to the South Dakota Board of Regents *Strategic Plan 2022-2027* Goal 4: Workforce and Economic Development – “Public post-secondary and higher education serves as a critical pipeline for the workforce locally in South Dakota and as well as nationally and globally.”¹

In addition, the Geospatial Intelligence certificate will contribute to the attainment of SDSU's *Imagine 2023* strategic plan Strategic Goal 1 – Excellence through Transformative Education. The certificate will utilize active and innovative teaching and learning practices and incorporates multiple skills, including inquiry and analysis, critical thinking, teamwork, and problem-solving.²

4. Provide a justification for the certificate program, including the potential benefits to students and potential workforce demand for those who graduate with the credential.

Geospatial intelligence occupations require exposure to geospatial skills. Many projections from government agencies and market research firms alike point toward considerable growth of the geospatial technology industry as well as growth in Geographic Information Systems (GIS) and remote sensing-related employment sectors and fields. According to Verified Market Research, the Global Geospatial Solutions Market was valued at \$202 billion in 2021 and will

¹ South Dakota Board of Regents. <https://www.sdbor.edu/the-board/StrategicPlan/Pages/default.aspx> (page 15, visited September 13, 2022).

² South Dakota State University. <https://www.sdstate.edu/imagine-2023-aspire-discover-achieve> (visited September 13, 2022).

reach \$506.2 billion by 2030, with a market growth rate of 12.1% between 2022 to 2030.³

CareerOneStop, sponsored by the U.S. Department of Labor's Bureau of Labor Statistics (BLS), expects jobs in the field of cartography and photogrammetry to grow by approximately 3% nationally between 2021 and 2031 and increase 13% in South Dakota from 2020 to 2030, with a median salary of \$68,900.⁴ Occupations in Intelligence Analysts are projected to grow by 1% nationally between 2021 and 2031, with a median income of \$83,640 and 4% increase in South Dakota from 2020 to 2030.⁵ Geographic Information Systems Technologists and Technicians are projected to increase nationally by 10% between 2021 and 2031, with a median income of \$95,270.⁶ Remote Sensing Technicians are projected to grow by 7% nationally from 2021 to 2031 and 33% in South Dakota from 2020 to 2030 with a median salary of \$49,030.⁷ Employment in jobs related to cartography, GIS and remote sensing are excellent opportunities for recent university graduates who have exposure to the technologies.

It is anticipated that there will be strong interest in this credential among students who wish to serve in national security occupations, particularly the National Geospatial-Intelligence Agency (NGA). This credential should be popular with students, veterans, and active military. Graduate students from geography, geographic information sciences, computer science, and data science should have an interest in this certificate.

5. Who is the intended audience for the certificate program (including but not limited to the majors/degree programs from which students are expected)?

Students receiving the Geospatial Intelligence Certificate would be situated to apply for national security jobs within the federal government, which include the National Geospatial-Intelligence Agency, Central Intelligence Agency, Federal Bureau of Investigation, Defense Intelligence Agency, National Security Agency, Military Intelligence, FEMA, and Drug Enforcement Administration, among others.⁸ Students could also work for government contractors at various agencies. Geospatial intelligence is used by more than just national agencies. Increasingly, local civil service agencies rely heavily on GEOINT skills to better protect and serve their communities. These skills can be used by law enforcement agencies and emergency management agencies for natural disasters and public health emergencies.

6. Certificate Design

A. Is the certificate designed as a stand-alone education credential option for students not seeking additional credentials (i.e., a bachelor's or master's degree)? If so, what areas of high workforce demand or specialized body of knowledge will be addressed

³ <https://www.verifiedmarketresearch.com/product/geospatial-solutions-market/> (visited August 25, 2022).

⁴ Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Cartographers and Photogrammetrists, at <https://www.bls.gov/ooh/architecture-and-engineering/cartographers-and-photogrammetrists.htm> (visited February 28, 2023).

⁵ O*NET/U.S. Department of Labor/Employment and Training Administration <https://www.onetonline.org/link/summary/33-3021.06> (visited February 28, 2023).

⁶ U.S. Department of Labor Employment and Training Administration. *CareerOneStop*, <https://cloudfront.careeronestop.org/Toolkit/Careers/Occupations/occupation-profile.aspx?keyword=Geographic%20Information%20Systems%20Technologists%20and%20Technicians&onetcode=15129902&location=UNITED%20STATES&lang=en> (visited February 28, 2023).

⁷ U.S. Department of Labor Employment and Training Administration. *CareerOneStop*, <https://cloudfront.careeronestop.org/Toolkit/Careers/Occupations/occupation-profile.aspx?keyword=Remote%20Sensing%20Technicians&onetcode=19409903&location=UNITED%20STATES&lang=en> (visited February 28, 2023).

⁸ https://www.nga.mil/resources/GEOINT_Basic_Doctrine_Publication_10_.html (visited February 28, 2023).

through this certificate?

The certificate is not intended as a stand-alone credential.

B. Is the certificate a value added credential that supplements a student’s major field of study? If so, list the majors/programs from which students would most benefit from adding the certificate.

The certificate will be a value-added credential for students pursuing the M.S. in Computer Science, Data Science, Electrical Engineering, Geography, and Geography - Geographic Information Sciences Specialization and the Ph.D. in Computer Science, Electrical Engineering, Geospatial Science and Engineering - Geography Specialization, and Geospatial Science and Engineering - Remote Sensing Specialization.

C. Is the certificate a stackable credential with credits that apply to a higher level credential (i.e., associate, bachelor’s, or master’s degree)? If so, indicate the program(s) to which the certificate stacks and the number of credits from the certificate that can be applied to the program.

The certificate can be stackable with the M.S. Geography, Geography - Geographic Information Sciences Specialization, and the Ph.D. Geospatial Science and Engineering - Geography Specialization, and Geospatial Science and Engineering - Remote Sensing Specialization.

7. List the courses required for completion of the certificate in the table below (if any new courses are proposed for the certificate, please attach the new course requests to this form).

AAC Guideline 2.7 limits certificates to nine to twelve credit hours unless valid reasons exist to exceed the limit. SDSU requests an exception to the guideline to allow for the graduate certificate to require fifteen credits. USGIF accreditation stipulates that a graduate certificate be 15 credits or more.⁹ Therefore, SDSU requests that this graduate certificate be 15 credit hours. Comparable graduate certificates include University of Missouri – 18 credits,¹⁰ Pennsylvania State University – 15 credits,¹¹ University of Texas at Dallas – 15 credits,¹² and George Mason University - 18 credits.¹³ SDSU’s program is modeled after these similar programs by requiring the completion of coursework.

⁹ USGIF Collegiate Geospatial Intelligence Accreditation Standards & Criteria (pp. 7 section 3.6) <https://usgif.org/education/#geoint-certificates>; https://usgif.wpenginepowered.com/wp-content/uploads/2020/12/2019_USGIF_Accreditation_Standards_.pdf (visited February 28, 2023).

¹⁰ University of Missouri – GEOINT Graduate Certificate <https://geography.missouri.edu/current-students/geospatial-intelligence> (visited February 28, 2023).

¹¹ Pennsylvania State University – Graduate Certificate in Geospatial Intelligence <https://geospatial.umd.edu/education/master-science-geospatial-intelligence#tab-1> (visited February 28, 2023).

¹² University of Texas at Dallas – Graduate Certificate in Geospatial Intelligence <https://catalog.utdallas.edu/now/graduate/programs/epps/certificate-programs#geospatial-intelligence-cert> (visited February 28, 2023).

¹³ George Mason University – Geospatial Intelligence Graduate Certificate <https://catalog.gmu.edu/colleges-schools/science/geography-geoinformation-science/geospatial-intelligence-graduate-certificate/#requirementstext> (visited February 28, 2023).

Prefix	Number	Course Title	Prerequisites for Course	Credit Hours	New (yes, no)
GEOG OR GEOG	547 790	Geography of the Future (3 cr) (Capstone) Independent Study (3 cr) (Capstone)	None	3	No
GEOG	573	GIS: Data Creation & Integration	None	2	No
GEOG	573L	GIS: Data Creation & Integration Lab	None	1	No
GEOG	580	Satellite Remote Sensing	None	2	No
GEOG	580L	Satellite Remote Sensing Lab	None	1	No
Select six credits from the following list. Credits: 6					
GEOG	571	Introduction to GIS Programming	None	3	No
GEOG	574	GIS: Vector & Raster Modeling	None	2	No
GEOG	574L	GIS: Vector & Raster Modeling Lab	None	1	No
GEOG	575	GIS Applications	None	2	No
GEOG	575L	GIS Applications Lab	None	1	No
GEOG	576	Web GIS	None	2	No
GEOG	576L	Web GIS Lab	None	1	No
GEOG	577	Spatial Databases	None	2	No
GEOG	577L	Spatial Databases Lab	None	1	No
GEOG	741	Quantitative Remote Sensing for Terrestrial Monitoring	None	3	No
GEOG	760	Advanced Methods in Geospatial Modeling	None	3	No
GEOG	784	Machine Learning for Remote Sensing and GIS	None	3	No
GEOG	786	Geographic Information Systems	None	3	No
Subtotal				15	

8. Student Outcome and Demonstration of Individual Achievement.

Board Policy 2:23 requires certificate programs to “have specifically defined student learning outcomes.

A. What specific knowledge and competencies, including technology competencies, will all students demonstrate before graduation? The knowledge and competencies should be specific to the program and not routinely expected of all university graduates.

At the completion of the Geospatial Intelligence Certificate students will be able to:

- Understand basic concepts, components, structures, and functionalities of geographic information science (GISc).
- Use common GISc techniques to collect, analyze, process, and present spatial or geographical data.
- Demonstrate critical thinking skills in solving geospatial problems.
- Communicate and present geographic data, theories, philosophies, and concepts in oral, written, and visual forms with ethical engagement and respect for the diversity of individuals, groups, and cultures.

B. Complete the table below to list specific learning outcomes – knowledge and competencies – for courses in the proposed program in each row.

Individual Student Outcome	Program Courses that Address the Outcomes			
	GEOG 547 or GEOG 790	GEOG 573- 573L	GEOG 580	Technical Electives
Understand basic concepts, components, structures, and functionalities of geographic information science (GISc).		X	X	X
Use common GISc techniques to collect, analyze, process, and present spatial or geographical data.		X	X	X
Demonstrate critical thinking skills in solving geospatial problems.	X	X	X	X
Communicate and present geographic data, theories, philosophies, and concepts in oral, written, and visual forms with ethical engagement and respect for the diversity of individuals, groups, and cultures.	X			

9. Delivery Location.

Note: The accreditation requirements of the Higher Learning Commission (HLC) require Board approval for a university to offer programs off-campus and through distance delivery.

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., USD Community College for Sioux Falls, Black Hills State University-Rapid City, Capital City Campus, etc.) or deliver the entire program through distance technology (e.g., as an on-line program)?

	Yes/No	Intended Start Date
On campus	Yes	2023-2024 Academic Year

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

	Yes/No	If Yes, identify delivery methods <i>Delivery methods are defined in AAC Guideline 5.5.</i>	Intended Start Date
Distance Delivery (online/other distance delivery methods)	Yes	015 Internet Asynchronous – Term Based Instruction; 018 Internet Synchronous	2023-2024 Academic Year
Does another BOR institution already have authorization to offer the program online?	No	If yes, identify institutions:	

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)? This question responds to HLC definitions for distance delivery.

	Yes/No	If Yes, identify delivery methods	Intended Start Date
Distance Delivery	No		

	Yes/No	<i>If Yes, identify delivery methods</i>	<i>Intended Start Date</i>
(online/other distance delivery methods)			