SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS

New Certificate

UNIVERSITY:	**USD**
TITLE OF PROPOSED CERTIFICATE:	**Geospatial Analysis**
INTENDED DATE OF IMPLEMENTATION:	**Fall 2020**
PROPOSED CIP CODE:	**30.3301**
UNIVERSITY DEPARTMENT:	**Sustainability & Environment**
BANNER DEPARTMENT CODE:	**USUS**
UNIVERSITY DIVISION:	**College of Arts & Sciences**
BANNER DIVISION CODE:	**2A**

☒ **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.

Elizabeth M. Freeburg	3/19/2020
Institutional Approval Signature	Date
President or Chief Academic Officer of the University	

Note: In the responses below, references to external sources, including data sources, should be documented with a footnote (including web addresses where applicable).

1. Is this a graduate-level certificate or undergraduate-level certificate (*place an "X" in the appropriate box*)?

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.

Geospatial analysis is the collection, analysis, and visualization of spatial data. Doing geospatial analysis requires the ability to use software including geographic information systems (GIS) and remote sensing and may require the ability to use equipment and hardware that integrate with the software including sensors and unmanned aerial vehicles (UAVs).

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

The certificate in geospatial analysis relates to USD's mission to provide instruction in the liberal arts and sciences because it will complement the existing graduate degrees in sustainability, biology, and public administration by training students in methods and software that are commonly used within these fields. The certificate aligns with the Board of Regents Strategic Plan because it will train students in methods and software that will allow them to contribute to research and economic development within the State.

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.** *For workforce related information, please provide data and examples. Data may include, but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc. Please cite any sources in a footnote.*

The skills that the students will learn in the geospatial analysis certificate will complement the content knowledge that students will learn in their graduate degree programs. Therefore, the certificate will offer an additional credential to students who are looking to work in fields such as soil and plant science (projected 10.8% increase), environmental scientists (projected 11.8% increase), and biological technicians (projected 11.3% increase).[1]

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

The geospatial analysis certificate will be open to any graduate student, but we expect many of the students who earn the certificate will be sustainability, biology, and public administration majors.

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 through this certificate?**

      Yes, the certificate is a stand-alone education credential option. The students will learn how to use different software for data analysis such as GIS, remote sensing, LIDAR, R, and Python.

   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.**

      Yes, the certificate will supplement the student's graduate degree. Students majoring in sustainability, biology, and public administration will benefit from this certificate program.

[1] South Dakota Department of Labor and Regulation (2016) Occupational employment projections (2016-2026) for sub-state areas. Available at https://dlr.sd.gov/lmic/menu_projections_occupation.aspx.

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 geospatial analysis certificate will not be fully stackable to a higher-level credential, but some of the courses within the certificate may also count towards the student's major. For example, Introduction to GIS is currently offered as an earth science and political science course (i.e. ESCI/POLS 525). Remote Sensing will be offered for the first time in Fall 2020 and will be offered as BIOL 592.

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). *Certificate programs by design are limited in the number of credit hours required for completion. Certificate programs consist of nine (9) to twelve (12) credit hours, including prerequisite courses. In addition, certificates typically involve existing courses. If the curriculum consists of more than twelve (12) credit hours (including prerequisites) or includes new courses, please provide explanation and justification below.*

Prefix	**Number**	**Course Title** *(add or delete rows as needed)*	**Prerequisites for Course** *Include credits for prerequisites in subtotal below.*	**Credit Hours**	**New (yes, no)**
ESCI/POLS	525	Introduction to GIS	None	3	No
BIOL	584/L	Remote Sensing[1]	ESCI/POLS 525	3	Yes
Take two of the following courses (6 credit hours)					
CSC	567	Data Analysis, Decision Making and Visualization[1]	None	3	Yes
BIOL/SUST	592	Topics: Unmanned Aircraft Systems (UAS) Applications[2]	ESCI/POLS 525	3	No
SUST	715	Research for Sustainability	None	3	No
BIOL/SUST	792	Topics: Advanced Geospatial Analysis[2]	ESCI/POLS 525 and BIOL 584/L	3	Yes
GEOL	519	Advanced Geospatial Analysis	GEOL 516/L or instructor permission[3]	3	No
			Subtotal	12	

[1]BIOL 584/L and CSC 567 are new courses to be offered by the Biology and Computer Science departments based on recent hires and reallocated teaching rotations; these requests are attached at the end of this document.

[2]BIOL/SUST 592 and 792 are existing Topics courses that will be offered with this topic as part of current faculty rotations.

[3]GEOL 516/L is Introduction to GIS. ESCI/POLS 525 will provide the required prerequisite knowledge for GEOL 519.

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.*

- Students will explain the fundamental theories underlying geospatial technologies.
- Students will acquire and manage geospatial data as appropriate to a given application.
- Students will apply spatial thinking principles using geospatial analysis procedures.
- Students will design maps to visualize and communicate spatial information.

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

	Program Courses that Address the Outcomes						
Individual Student Outcome (Same as in the text of the proposal)	ESCI /POLS 525*	BIOL 584/L*	CSC 506	SUST 715	BIOL/ SUST 592	BIOL/ SUST 792	GEOL 519
Explain the fundamental theories underlying geospatial technologies	X	X	X			X	X
Acquire and manage geospatial data as appropriate to a given application	X	X	X		X	X	X
Apply spatial thinking principles using geospatial analysis procedures	X	X		X	X	X	X
Design maps to visualize and communicate spatial information	X	X				X	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., 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)?

	Yes/No	***Intended Start Date***
On campus	Yes	**Fall 2020**

	Yes/No	***If Yes, list location(s)***	***Intended Start Date***
Off campus	No		Choose an item. Choose an item.

Yes/No	***If Yes, identify delivery methods*** *Delivery methods are defined in AAC Guideline 5.5.*	***Intended Start Date***

Distance Delivery (online/other distance delivery methods)	No		Choose an item. Choose an item.
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 (online/other distance delivery methods)	No		Choose an item. Choose an item.

10. Additional Information

We have spoken with Dr. Maribeth Price and Mr. Curtis Price at SDSMT about their undergraduate and graduate certificates in Geospatial Technology. Following this conversation, we have added GEOL 519 to the list of approved electives for the certificate. We also intend to collaborate in the future as additional opportunities become available.

SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS

Authority to Offer an Existing Course

USD	**Arts & Sciences/Biology**
Institution	**Division/Department**

	2/20/2020
Institutional Approval Signature	**Date**

1. Is this a request to offer an existing common course or an existing unique course (approval will change course status from unique to common)?

Common Course ☒
Unique Course ☐

2. Provide the complete description as it appears in the system database including pre-requisites and co-requisites.

Prefix & No.	Course Title	Credits
GEOG/BIOL 484/584/L	Remote Sensing	3/0

Course Description

Applications of remote sensing. Development of remote sensing; instrumentation; and techniques and methodology that will aid in the determination of proper utilization of our physical and cultural resources.

Pre-requisites or Co-requisites (add lines as needed, make sure to copy boxes in Pre-req and Co-req cells)

Prefix & No.	Course Title	Pre-req	Co-req
		Choose an item.	Choose an item.

3. Universities currently offering this course (*place an "X" in the appropriate boxes*):

☐ BHSU ☐ DSU ☒ NSU ☐ SDSMT ☐ SDSU ☐ USD

4. Does Offering the Course Create FTE Implications? No

If no, Replacement of _____ (deletion form attached)
(prefix, number, name of course, credits)
Effective Date of Deletion: Click here to enter a date.

5. **Does Offering the Course Create Schedule Management Implications?** No
   Explain: The course will be taught by existing faculty as part of their normal workload.

6. **Existing program(s) in which course will be offered:** Biology, Sustainability

7. **CIP Code for the course:** 45.0702

8. **Proposed instructional method by this university:** R

9. **Proposed delivery method by this university:** 001

10. **University Dept. Code:** UBIOL

    Banner Department Code: UBIO

11. **Authority to offer effective beginning in what term?** Fall 2021

12. **Section Restriction:** 24

SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS
New Course Request

USD	**Arts & Sciences/Computer Science**
Institution	**Division/Department**

Institutional Approval Signature **Date**

Section 1. Course Title and Description

Prefix & No.	Course Title	Credits
CSC 467/567	Data Analysis, Decision Making, and Visualization	3

Course Description

The course aims to deliver fundamental ideas on analyzing data with the help of statistics, implementing scientific decisions using machine learning tools/techniques, and visualizing them for production at the output in accordance with the user's need. The course employs current programming languages appropriate to the discipline.

Pre-requisites or Co-requisites

Prefix & No.	Course Title	Pre-Req/Co-Req?
CSC 155/155L	Introduction to Computer Science & Programming	Pre-Req.

Registration Restrictions

N/A

Section 2. Review of Course

2.1. Was the course first offered as an experimental course (*place an "X" in the appropriate box*)?

☐ Yes *(if yes, provide the course information below)* ☒ No

2.2. Will this be a unique or common course (*place an "X" in the appropriate box*)?

If the request is for a unique course, verify that you have reviewed the common course catalog via Colleague and the system Course Inventory Report to determine if a comparable common course already exists. List the two closest course matches in the common course catalog and provide a brief narrative explaining why the proposed course differs from those listed. If a search of the common course catalog determines an existing common course exists, complete the Authority to Offer an Existing Course Form.

☒ **Unique Course**

Prefix & No.	Course Title	Credits
CSC 486/586	Data Mining	3
CSC 460	Scientific Visualization	3

Provide explanation of differences between proposed course and existing system catalog courses below:

CSC 486/586 is a course that explores data, especially large data; however, CSC 486/586 does not incorporate the decision making and visualization component that CSC 467/567 offers. The proposed course has a capability to deliver fundamental ideas on analyzing data, implementing scientific decisions using machine learning tools/techniques that are built upon statistical modeling, and visualizing them for production at the output in

accordance with the user's need. CSC 486/586 does not incorporate decision-making and data/decision visualization components. CSC 460 is limited to visualization.

Section 3. Other Course Information

3.1. Are there instructional staffing impacts?

☐ **No**. Replacement of _____
(course prefix, course number, name of course, credits)
*Attach course deletion form

Effective date of deletion: Click here to enter a date.

This course will be taught with current faculty.

☒ **No**. Schedule Management, explain below:

CSC 467/567 will be part of the regular faculty teaching load on the course rotation.
No new hiring will be necessary.

☐ **Yes**. Specify below:

3.2. Existing program(s) in which course will be offered: B.A./B.S./M.S. in Computer Science.

3.3. Proposed instructional method by university: D Discussion/Recitation

3.4. Proposed delivery method by university: 001: Face-to-face Term Based Instruction and Online if offered during summer term.

3.5. Term change will be effective (enter catalog year): 2020-21

3.6. Can students repeat the course for additional credit?

☐ Yes, total credit limit: _____ ☒ No

3.7. Will grade for this course be limited to S/U (pass/fail)?

☐ Yes ☒ No

3.8. Will section enrollment be capped?

☒ Yes, max per section: 30 ☐ No

3.9. Will this course equate (i.e., be considered the same course for degree completion) with any other unique or common courses in the common course system database in Colleague and the Course Inventory Report?

☐ Yes ☒ No

3.10. Is this prefix approved for your university?

☒ Yes ☐ No

Section 4. Department and Course Codes (Completed by University Academic Affairs)

4.1. University Department Code: UCSC

4.2. Proposed CIP Code: 11.0701

Is this a new CIP code for the university? ☐ Yes ☒ No