



SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS

New Certificate

UNIVERSITY:	SDSU
TITLE OF PROPOSED CERTIFICATE:	Precision Agriculture
INTENDED DATE OF IMPLEMENTATION:	2022-2023 Academic Year
PROPOSED CIP CODE:	01.0301
UNIVERSITY DEPARTMENT:	Grad Study Agriculture, Food & Environmental Sciences
BANNER DEPARTMENT CODE:	SGAF
UNIVERSITY DIVISION:	Graduate School
BANNER DIVISION CODE:	3G

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.



 Institutional Approval Signature
 President or Chief Academic Officer of the University



 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 Precision Agriculture. The proposed Precision Agriculture Certificate will provide knowledge and practical experience for students to have an advanced experience with precision farming and its protocols. Individuals that complete this certificate will be well prepared to advance in their career paths in the modern agricultural industry that utilizes advanced precision technology. Additional electives are available for those that wish to pursue this field further.

The graduate certificate is designed to be either a stand-alone, value-added, or stacked credential. The certificate stacks to the M.S. in Professional Science, one of seven proposed certificates that would stack to that degree.

SDSU does not request new state resources for the proposed certificate.

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.

SDSU is currently authorized to deliver a B.S. in Precision Agriculture.

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.

Agriculture is experiencing a fast-paced evolution as technology continues to develop. Precision agriculture has emerged with an array of new and exciting – and increasingly high-tech – tools. The integration of computer technology with farm equipment, farm sensors, GPS navigation, satellite imagery and drone imagery are quickly revolutionizing agricultural production. While this revolutionary evolution is creating new opportunities within the agricultural industry, it is also generating a need for college graduates, pertinent and applicable research, and Extension expertise related to precision agriculture. SDSU is addressing this change in needs by leading the nation with its B.S. program in Precision Agriculture.

Given the strong interest in advanced agricultural practices utilizing precision techniques, individuals with the type of training provided by this certificate program will be in high demand. Individuals may currently be in or pursuing careers in agronomy, agribusiness organizations, ranch management, geographic information science, geography, Game, Fish and Parks (GFP), Bureau of Land Management (BLM), environmental non-government organizations (NGOs), or sustainability. According to the Bureau of Labor Statistics, those with master's degrees, specialized subject matter expertise, and experience with technologies such as Geographic Information Systems, typically used in Precision Agriculture, will have the best job prospects.¹ Further, employment prospects for soil and plant scientists are expected to increase by 7% during the period 2019-2029.² In response to need for increased efficiency of agricultural production systems and reduction of environmental damage, agricultural engineers are expected to be in demand, specifically for precision and automated farming technologies.³

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 University anticipates students enrolling to be undergraduates continuing onto a graduate degree and those already employed (new or returning to the university). The graduate certificate is designed to be either a stand-alone, value-added, or stacked credential. The certificate stacks to the M.S. in Professional Science, one of seven proposed certificates that would stack to that program. Students with a bachelor's degree, but with work experience in

¹ Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Geographers <https://www.bls.gov/ooh/life-physical-and-social-science/geographers.htm#tab-6> (Accessed 1 July 2021)

² Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Agricultural and Food Scientists <https://www.bls.gov/ooh/life-physical-and-social-science/agricultural-and-food-scientists.htm#tab-6> (Accessed 1 July 2021)

³ Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Agricultural Engineers <https://www.bls.gov/ooh/architecture-and-engineering/agricultural-engineers.htm#tab-6> (Accessed 1 July 2021)

the field will particularly benefit from this program. In addition, the certificate will benefit students in agronomy, agricultural and biosystems engineering, animal science, dairy science, geographic information science, geography, and natural resource management.

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. Students may pursue the certificate as a stand-alone credential. As a stand-alone program the certificate will provide advanced experience with precision farming and its protocols. Individuals complete this certificate will be well prepared to advance in their career paths in the modern agricultural industry that utilizes advanced precision technology.

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 is intended to supplement a SDSU graduate education. The disciplines most likely to benefit would be agronomy, agricultural and biosystems engineering, animal science, dairy science, geographic information science, geography and natural resource management.

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.

Yes. The Precision Agriculture Certificate may be a stackable credential. Students may apply the credits to the Professional Science (M.S.).

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).

Prefix	Number	Course Title	Prerequisites for Course	Credit Hours	New (yes, no)
GEOG	573-573L	GIS Data Creation/Integration	None	3, 0	No
GEOG	575-575L	GIS Applications and Lab	None	3, 0	No
PRAG	510-510L	Soil Geography and Land Use Interpretation	None	2, 1	No
PRAG	523	Soil Fertility and Plant Nutrient Management	None	3	No
Subtotal				12	

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?

Students in the Precision Agriculture certificate will:

- Develop understanding of soil and its use.
- Develop an understanding of precision nutrient management.
- Demonstrate an understanding of GIS data.
- Develop mastery of management through precision farming.
- Develop understanding of GIS applications for precision farming.

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

Individual Student Outcomes	Program Courses that Address the Outcomes			
	GEOG 573-573L	GEOG 575-575L	PRAG 510-510L	PRAG 523
Develop understanding of soil and its use.			X	
Develop an understanding of precision nutrient management.				X
Demonstrate an understanding of GIS data.	X			
Develop mastery of management through precision farming.				
Develop understanding of GIS applications for precision farming.		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 online program)?

	Yes/No	Intended Start Date
On campus	Yes	2022-2023 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	2022-2023 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 online program)? *This question responds to HLC definitions for distance delivery.*

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