SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs
Consent

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SUBJECT
New Program Request – SDSU – Minor in Uncrewed Aircraft Systems

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 minor in Uncrewed Aircraft Systems. Uncrewed Aircraft Systems (UAS) is a technology with many commercial applications, including remote sensing, geographic information systems (GIS), precision agriculture, construction, resource management, engineering, cinematography, and emergency services. The proposed minor will provide a credential to students who have demonstrated competency in the planning and operation of UAS, including the equipment, accessories, and software needed to fly uncrewed aerial vehicles (i.e., drones) autonomously or remotely.

IMPACT AND RECOMMENDATION
SDSU plans to offer the minor in Uncrewed Aircraft Systems on campus. SDSU does not request new state resources, and no new courses will be required. SDSU estimates 8 students enrolled and 5 graduates by the fourth year of the program.

Board office staff recommends approval.

ATTACHMENTS
Attachment I – New Program Request Form: SDSU – Minor in Uncrewed Aircraft Systems

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DRAFT MOTION 20230329_5-B(2):
I move to authorize SDSU to offer a minor in Uncrewed Aircraft Systems, as presented.

SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS
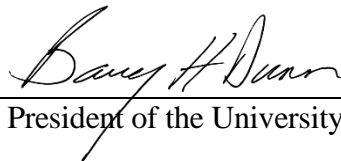
New Baccalaureate Degree Minor

UNIVERSITY:	SDSU
TITLE OF PROPOSED MINOR:	**Uncrewed Aircraft Systems**
DEGREE(S) IN WHICH MINOR MAY BE EARNED:	**Any**
EXISTING RELATED MAJORS OR MINORS:	**Geographic Information Sciences (B.S., minor, certificate), Geography (B.A., B.S., minor), Unmanned Aircraft Systems (certificate)**
INTENDED DATE OF IMPLEMENTATION:	**Fall 2023**
PROPOSED CIP CODE:	**49.0109**
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 2.8, which pertains to new baccalaureate degree minor 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.

President of the University	1/5/2023
	Date

1. **Do you have a major in this field?** ☐ Yes ☒ No

2. **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.**

   South Dakota State University (SDSU) requests authorization to offer a baccalaureate minor in Uncrewed Aircraft Systems (UAS). Uncrewed Aircraft Systems (UAS) is a technology with many commercial applications, some of which include remote sensing, geographic information systems (GIS), precision agriculture, construction, resource management, engineering, cinematography, and emergency services.

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.), Unmanned Aircraft Systems Certificate[1], and Geospatial Science and Engineering (Ph.D.) - Geography and Remote Sensing Specializations.

This undergraduate minor fits with the mission and strategic plan of South Dakota State University. The UAS minor will contribute to the attainment of SDSU's *Imagine 2023* strategic plan Strategic Goal 1 – Excellence through Transformative Education. The minor will utilize active and innovative teaching and learning practices and incorporates multiple cross-curricular skills, including inquiry and analysis, critical thinking, teamwork and problem-solving.[2]

In addition, the Uncrewed Aircraft Systems minor will contribute to the South Dakota Board of Regents' *Strategic Plan 2022-2027* Goal 4: Workforce and Economic Development in which "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".[3]

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

The proposed minor in Uncrewed Aircraft Systems (UAS) will provide a credential to students who have demonstrated competency in the planning and operation of UAS. An uncrewed aerial vehicle (UAV), commonly known as a drone, is an aircraft without any human pilot, crew, or passengers controlling it from the inside. Uncrewed Aircraft Systems or UAS is the system behind what makes a drone or UAV work. This includes the equipment, accessories, and software needed to allow a UAV to fly autonomously or remotely. Uncrewed Aircraft Systems is a technology with many commercial applications, some of which include remote sensing, geographic information systems (GIS), precision agriculture, construction, resource management, engineering, cinematography, and emergency services.

4. **How will the proposed minor benefit students?**

The minor will provide the knowledge and skills necessary to apply this technology to a field of study or field of work. The minor will cover mission planning and safety, how to acquire data using sensors, how to process acquired data, ethical considerations, and the basic components required to operate a UAS, among others. This minor will provide the knowledge necessary to attain the FAA Part 107 small UAS license.

5. **Describe the workforce demand for graduates in related fields, including national demand and demand within South Dakota.** *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. Please cite any sources in a footnote.*

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[1] A substantive program modification will be processed during the 2022-2023 academic year to update the program title from *Unmanned Aircraft Systems* to *Uncrewed Aircraft Systems*.
[2] South Dakota State University. https://www.sdstate.edu/imagine-2023-aspire-discover-achieve (visited September 13, 2022).
[3] South Dakota Board of Regents. https://www.sdbor.edu/the-board/StrategicPlan/Pages/default.aspx (page 15, visited September 13, 20220.

Uncrewed Aircraft Systems (UAS) plays a significant role in the defense, commercial and public sectors. According to Markets and Markets, the drone services market, which is based on the type of service provided, is segmented by industry to include construction and infrastructure, agriculture, utility, oil and gas, mining, defense and law enforcement, mapping, surveying, media and entertainment, scientific research, insurance, aviation, marine, healthcare and social assistance, and transportation, logistics, and warehousing.[4] The drone services market is expected to grow from $13.9 billion in 2021 to $40.7 billion in 2026, an increase of 23.8%.[5] The FAA forecasts that the commercial drone fleet in the US will increase 1.38 times from 2021 to 2026, an increase of 37.9%.[6] The FAA also forecasts that between 2021 and 2026 the number of people obtaining a commercial Remote Pilots licenses will increase by over 100,000 "that may provide tremendous opportunities for growth in employment."[7]

These numbers are highlighted to show the overall forecasted growth in the commercial drone fleet in the US and the number of new remote pilots projected over the next five years. This will be reflected in the labor market. The US Department of Labor does not have an occupational code for a drone pilot, however, based on the numbers above there will be a need for employees with skill in UAS technology. While some jobs could require just a drone pilot, most occupations requiring the operation of the technology will be part of an existing job role. For example, workforce areas that anticipate an increase of drone usage include agriculture, construction, emergency management, transportation, energy, and mapping and surveying.[8] According to the Occupational Information Network (O*NET) - sponsored by the US Department of Labor - from 2018 to 2028 occupations that could employ drone skills in South Dakota such as Precision Agriculture Technicians will increase 14%, Agricultural Engineers 13%, Soil and Plant Scientists 16%, Range Managers 6%, Transportation Inspectors 13%, Property, Real Estate, and Community Association Managers 9%, Emergency Management Directors 10%, Wind Energy Operations Manager 7%, Construction Managers 7%, Surveyors 14%, Cartographers and Photogrammetrists 13%, and Geographic Information Systems Technologists and Technicians 5%.[9]

6. **Provide estimated enrollments and completions in the table below and explain the methodology used in developing the estimates.**

The estimates below are based on 10% of student enrollment in the Geography (36) and Geographic Information Sciences (25) majors for year 4. The number will increase as Geography, Geographic Information Sciences, and other majors identify the benefit of adding this minor. GEOG 270 Introduction to Small Uncrewed Aircraft Systems has had over 120 students complete the course from the fall of 2020 to the fall of 2022.

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[4] Markets and Markets https://www.marketsandmarkets.com/ResearchInsight/drone-services-market.asp (last accessed September 2, 2022).
[5] Markets and Markets https://www.marketsandmarkets.com/Market-Reports/unmanned-aerial-vehicles-uav-market-662.html (last accessed September 2, 2022).
[6] Federal Aviation Administration. FAA Aerospace Forecast FY 2021-2025. https://www.faa.gov/data_research/aviation/aerospace_forecasts (page 63, last accessed September 13, 2022).
[7] Federal Aviation Administration. FAA Aerospace Forecast FY 2021-2025. https://www.faa.gov/data_research/aviation/aerospace_forecasts (page 73, last accessed September 13, 2022).
[8] DroneU. Drone Pilot Jobs Guide: 13 Most Popular UAV Jobs https://www.thedroneu.com/blog/drone-pilot-jobs-guide/ (last accessed September 13, 2022).
[9] O*NET Online https://www.onetonline.org/ type in occupational name to see results. See state Trends for South Dakota. (last accessed September 13, 2022).

	Fiscal Years*			
	1st	2nd	3rd	4th
Estimates	FY 24	FY 25	FY 26	FY 27
Students enrolled in the minor (fall)	2	4	6	8
Completions by graduates	0	2	3	5

*Do not include current fiscal year.

7. What is the rationale for the curriculum? Demonstrate/provide evidence that the curriculum is consistent with current national standards.

There are no national standards for this program. The coursework was derived from the UAS Certificate and a collaborative effort with input from the associated programs in the proposed minor.

8. Complete the tables below. Explain any exceptions to Board policy requested.

A. Distribution of Credit Hours

Uncrewed Aircraft Systems Minor	Credit Hours	Percent
Requirements in minor	12	66.6%
Electives in minor	6	33.3%
Total	18	

B. Required Courses in the Minor

Prefix	Number	Course Title	Prerequisites for Course	Credit Hours	New (yes, no)
AVIA	200	Aviation Safety	none	3	No
GEOG	270	Introduction to Small Unmanned Aircraft Systems[10]	none	3	No
GEOG	387	UAS Photography & Videography	none	3	No
GEOG	483-483L	UAS Remote Sensing & Lab	none	3	No
			Subtotal	12	

C. Elective Courses in the Minor: List courses available as electives in the program. Indicate any proposed new courses added specifically for the minor.

Please select two courses from the following list. Credits: 6

Prefix	Number	Course Title	Prerequisites for Course	Credit Hours	New (yes, no)
AST	426-426L	Technology Applications for Precision Agriculture & Lab	none	3	No
AVIA	300	Human Factors in Aviation	none	3	No
BLAW	433	Real Estate	none	3	No
CM	400	Risk Management and Construction Safety	none	3	No

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[10] A minor course modification will be processed to revise the course title from Introduction to Small Unmanned Aircraft Systems to Introduction to Small Uncrewed Aircraft Systems. The change will be effective for fall 2023.

Prefix	Number	Course Title	Prerequisites for Course	Credit Hours	New (yes, no)
GEOG	280	Introduction to Remote Sensing	none	3	No
GEOG	372-372L	Introduction to GIS and Lab	none	3	No
GEOG	386	UAS Applications for Emergency Management	none	3	No

9. **What are the learning outcomes expected for all students who complete the minor? How will students achieve these outcomes?**

At the completion of the Uncrewed Aircraft Systems minor students will be able to:
- Describe UAS design, its components, and its current applications.
- Describe and apply small UAS laws, safety, and ethical considerations.
- Demonstrate relevant knowledge required to pass FAA 107 small UAS commercial pilot test.
- Plan and execute UAS missions in order to collect, process, and analyze UAS data.
- Identify, discuss, and summarize research applications, commercial applications, and limitations of small UAS
- Demonstrate the ability to work independently and as part of a team.

Individual Student Outcome	Program Courses that Address the Outcomes				
	AVIA 200	GEOG 270	GEOG 387	GEOG 483-483L	Electives
Describe UAS design, its components, and its current applications.	X	X	X	X	X
Describe and apply small UAS laws, safety, and ethical considerations.	X	X	X	X	X
Demonstrate relevant knowledge required to pass FAA 107 small UAS commercial pilot test.		X			
Plan and execute UAS missions in order to collect, process, and analyze UAS data.		X	X	X	X
Identify, discuss, and summarize research applications, commercial applications, and limitations of small UAS	X	X	X	X	X
Demonstrate the ability to work independently and as part of a team.	X	X	X	X	X

10. **What instructional approaches and technologies will instructors use to teach courses in the minor?** *This refers to the instructional technologies and approaches used to teach courses and NOT the technology applications and approaches expected of students.*

The courses associated with the minor will be face-to-face and online with instruction using lecture, discussion, lab exercises, and written exercises.

11. **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 Center 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 online 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* *Delivery methods are defined in* AAC Guideline 5.5.	*Intended Start Date*
Distance Delivery (online/other distance delivery methods)	No		
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 minor through distance learning (e.g., as an online 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)	Yes	S15-Online Asynchronous Term Based; S18-Online Synchronous	2023-2024 Academic Year

83% of the Uncrewed Aircraft Systems Minor is available online.

12. **Does the University request any exceptions to any Board policy for this minor? Explain any requests for exceptions to Board Policy.** *If not requesting any exceptions, enter "None."*

None

13. **Cost, Budget, and Resources: Explain the amount and source(s) of any one-time and continuing investments in personnel, professional development, release time, time redirected from other assignments, instructional technology & software, other operations and maintenance, facilities, etc., needed to implement the proposed minor.** *Address off-campus or distance delivery separately.*

The minor will be offered using existing resources only. The Department of Geography & Geospatial Sciences already has the resources, personnel, courses, lesson plans, and infrastructure required to implement the minor. No new investments are required at this time.

14. **New Course Approval: New courses required to implement the new minor may receive**

approval in conjunction with program approval or receive approval separately. Please check the appropriate statement.

☐ YES,
the university is seeking approval of new courses related to the proposed program in conjunction with program approval. All New Course Request forms are included as Appendix C and match those described in section 7.

☒ NO,
the university is not seeking approval of all new courses related to the proposed program in conjunction with program approval; the institution will submit new course approval requests separately or at a later date in accordance with Academic Affairs Guidelines.