



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

Substantive Program Modification Form

UNIVERSITY:	SDSU
CURRENT PROGRAM DEGREE:	Bachelor of Science (B.S.)
CURRENT PROGRAM MAJOR/MINOR:	Precision Agriculture
CURRENT SPECIALIZATION:	N/A
CIP CODE:	01.0301
UNIVERSITY DEPARTMENT:	Precision Agriculture
BANNER DEPARTMENT CODE:	SPAG
UNIVERSITY COLLEGE:	Agricultural, Food & Environmental Sciences
BANNER COLLEGE CODE:	3F

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.

Dennis D. Hedge

Vice President of Academic Affairs or
President of the University

3/28/2024

Date

1. This modification addresses a change in:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Total credits required within the discipline | <input checked="" type="checkbox"/> Total credits of supportive course work |
| <input checked="" type="checkbox"/> Total credits of elective course work | <input type="checkbox"/> Total credits required for program |
| <input type="checkbox"/> Program name | <input type="checkbox"/> Existing specialization |
| <input type="checkbox"/> CIP Code | <input type="checkbox"/> Other (explain below) |
| <input type="checkbox"/> Modification requiring Board of Regents approval | |

Must have prior approval from Executive Director or designee

2. Effective date of change: 2024-2025 Academic Year

3. Program Degree Level:

Associate Bachelor's Master's Doctoral

4. Category:

Certificate Specialization Minor Major

5. If a name change is proposed, the change will occur:

- On the effective date for all students
- On the effective date for students new to the program (enrolled students will graduate from existing program)

Proposed new name:

6. Is the program being modified associated with a current articulation agreement?

Yes No

a. If yes, will the articulation agreement need to be updated with the partner

institution following the approve of the program change? Please explain:

7. Primary Aspects of the Modification:

Existing Curriculum

Proposed Curriculum (highlight changes)

Prof.	Num.	Title	Cr. Hrs	Prof.	Num.	Title	Cr. Hrs
Systems General Education Requirements			31	Systems General Education Requirements			31
Systems General Education Requirements – Electives			12	Systems General Education Requirements – Electives			15
		SGR #1	3			SGR #1	3
		SGR #2	3			SGR #2	3
						SGR #3	3
		SGR #4	3			SGR #4	3
		SGR #4	3			SGR #4	3
Systems General Education Requirements – Required			19	Systems General Education Requirements – Required			16
ENGL	277	Technical Communications (SGR #1)	3	ENGL	277	Technical Communications (SGR #1)	3
ABS	203	Global Food Systems (SGR #3)	3	ABS	203	Global Food Systems (SGR #3)	3
ECON	201	Principles of Microeconomics (SGR #3)	3	ECON	201	Principles of Microeconomics (SGR #3)	3
MATH	114	College Algebra (SGR #5)	3	MATH	114	College Algebra (SGR #5)	3
CHEM	106	Chemistry Survey (SGR #6)	3	CHEM	106	Chemistry Survey (SGR #6)	3
CHEM	106L	Chemistry Survey Lab (SGR #6)	1	CHEM	106L	Chemistry Survey Lab (SGR #6)	1
BIOL	101	Survey of Biology I (SGR #6)	2	BIOL	101	Survey of Biology I (SGR #6)	2
BIOL	101L	Survey of Biology I Lab (SGR #6)	1	BIOL	101L	Survey of Biology I Lab (SGR #6)	1
Major Requirements			69	Major Requirements			83
ABS	475	Integrated Natural Resource Management	3	ABS	475	Integrated Natural Resource Management	3
ACCT OR AGEC OR AGEC	210 271 354	Principles of Accounting I (3) Farm and Ranch Management (3) Agricultural Marketing and Prices (3)	3	ACCT OR AGEC OR AGEC	210 271 354	Principles of Accounting I (3) Farm and Ranch Management (3) Agricultural Marketing and Prices (3)	3
AST OR PS	119 119	First Year Seminar (1) First Year Seminar (1)	1	AST OR PS	119 119	First Year Seminar (1) First Year Seminar (1)	1
AST	273	Micro Computer Applications in Agriculture	3	AST	273	Computer Applications in Agriculture	3
AST	313	Farm Machinery Systems Mgmt.	2	AST	313	Farm Machinery Systems Mgmt.	2
AST	313L	Farm Machinery Systems Mgmt. Lab	1	AST	313L	Farm Machinery Systems Mgmt. Lab	1
AST	333	Soil and Water Mechanics	2	AST	333	Soil and Water Mechanics	2
AST	333L	Soil and Water Mechanics Lab	1	AST	333L	Soil and Water Mechanics Lab	1
				AST	342	Applied Electricity	2
				AST	342L	Applied Electricity Lab	1
AST OR PS	390 490	Seminar (1) Seminar (1)	1	AST OR PS	390 490	Seminar (1) Seminar (1)	1
AST	412	Fluid Power Technology	2	AST	412	Fluid Power Technology	2
AST	412L	Fluid Power Technology Lab	1	AST	412L	Fluid Power Technology Lab	1
AST OR PRAG	426- 426L 428	Technology Applications for Precision Agriculture & Lab (2,1) Use of Soil and Plant Sensors in Crop Production (3)	3	AST OR PRAG	426- 426L 428	Technology Applications for Precision Agriculture & Lab (2,1) Use of Soil and Plant Sensors in Crop Production (3)	3
AST OR PS	494 494	Internship (1) Internship (1)	1	AST OR PS	494 494	Internship (1) Internship (1)	1
				BOT	201	General Botany	3
				BOT	201L	General Botany Lab	0
PRAG	203	Introduction to Precision Agriculture	2	PRAG	203	Introduction to Precision Agriculture	2
PRAG	203L	Introduction to Precision Agriculture Lab	1	PRAG	203L	Introduction to Precision Agriculture Lab	1
				PRAG	285	Agricultural Computations	2
PRAG	304	Electrical Diagnostics in Farm Machinery	2	PRAG	304	Electrical Diagnostics in Farm Machinery	2
PRAG	304L	Electrical Diagnostics in Farm Machinery Lab	1	PRAG	304L	Electrical Diagnostics in Farm Machinery Lab	1

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs	Pref.	Num.	Title	Cr. Hrs
PRAG	340	Climate Risk Management with Precision Agriculture	3	PRAG	340	Climate Risk Management with Precision Agriculture	3
PRAG	345	Principles and Implications of Chemical Application Systems	3	PRAG	345	Principles and Implications of Chemical Application Systems	3
PRAG OR PS	410- 410L 462- 462L	Soil Geography and Land Use Interpretation & Lab (2,1) Environmental Soil Management & Lab (2,1)	3	PRAG OR PS	410 410L 462 462L	Soil Geography and Land Use Interpretation & Lab (2,1) Environmental Soil Management & Lab (2,1)	3
PRAG	423	Soil Fertility and Plant Nutrient Management	3	PRAG	423	Soil Fertility and Plant Nutrient Management	3
PRAG	427	Precision Ag Data Mapping	2	PRAG	427	Precision Ag Data Mapping	2
				PRAG	428	Use of Soil and Plant Sensors in Crop Production	3
PRAG	440	Crop Management with Precision Farming	2	PRAG	440	Crop Management with Precision Farming	2
PRAG	440L	Crop Management with Precision Farming Lab	1	PRAG	440L	Crop Management with Precision Farming Lab	1
				PRAG	475	Senior Capstone	3
PS	103	Crop Production	2	PS	103	Crop Production	2
PS	103L	Crop Production Lab	1	PS	103L	Crop Production Lab	1
PS	213	Soils	2	PS	213	Soils	2
PS	213L	Soils Lab	1	PS	213L	Soils Lab	1
PS	223	Principles of Plant Pathology & Lab	2	PS	223	Principles of Plant Pathology & Lab	2
PS	223L	Principles of Plant Pathology Lab	1	PS	223L	Principles of Plant Pathology Lab	1
PS OR PS	407- 407L 405- 405L	Insect Pest Management & Lab (2,1) Entomology & Lab (3,0)	3	PS OR PS	407 407L 405 405L	Insect Pest Management & Lab (2,1) Entomology & Lab (3,0)	3
PRAG OR PRAG OR PRAG	424 425 426	Select four credits from the following three courses: Wheat Production (2) Soybean Production (2) Corn Production (2)	4	PRAG OR PRAG OR PRAG	424 425 426	Select four credits from the following three courses: Wheat Production (2) Soybean Production (2) Corn Production (2)	4
PS	445	Weed Science	3	PS	445	Weed Science	2
PS	445L	Weed Science Lab	0	PS	445L	Weed Science Lab	1
				STAT	281	Introduction to Statistics	3
STAT	383	Geospatial Data Analysis	3	STAT	383	Geospatial Data Analysis	3
						Emphasis Electives Students will select 21 credits from one of the following emphasis areas. All courses must be selected from within the same emphasis area	21
						Machinery Systems Emphasis	21
				PHYS	101	Survey of Physics	3
				PHYS	101L	Survey Physics lab	1
						Select 17 credits from the following list	
				AST	213	Ag, Industrial and Outdoor Power	2
				AST	213L	Ag, Industrial and Outdoor Power	1
				AST	313	Farm Machinery Systems Management	2
				AST	313L	Farm Machinery Systems Management Lab	1
				ET	122	Introductory Circuits	2
				ET	122L	Introductory Circuits Lab	1

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs	Pref.	Num.	Title	Cr. Hrs
				ET	210	Introduction To Electronic Systems	3
				ET	210L	Introduction To Electronic Systems Lab	1
				ET	232	Digital Electronics and Microprocessors	2
				ET	232L	Digital Electronics and Microprocessors Lab	1
				ET	240	Techniques of Servicing	3
				INFO	101	Introduction to Informatics	3
				INFO	102	Data Ethics	3
				PRAG	345	Chemical Applications in Agriculture	3
				PS	345	Non-chemical Weed Management	3
						Any 200 level or above selected from AST, CSC, ET, GEOG, DSCI, ENTR, PS, HORT, ME, CE, BADM, ECON, FIN, AS, AGECE	6
						Cropping Systems Emphasis	21
				CHEM	120	Elementary Organic Chemistry	2
				CHEM	120L	Elementary Organic Chemistry Lab	1
						Select 18 credits from the following list	
				AST	313	Farm Machinery Systems Management	3
				AST	313L	Farm Machinery Systems Management Lab	1
				AST	333	Soil and Water mechanics	2
				AST	333L	Soil and Water Mechanics lab	1
				PRAG	345	Chemical Applications in Agriculture	3
				PRAG	410	Soil Geography and Land Use Interpretation	2
				PRAG	410L	Soil Geography and Land Use Interpretation lab	1
				PS	223	Principles of Plant Pathology	2
				PS	223L	Principles of Plant Pathology lab	1
				PS	405	Entomology	2
				PS	405L	Entomology lab	1
				PS	407	Insect Pest Management	2
				PS	407L	Insect Pest Management lab	1
				PS	445	Weed Science	2
				PS	445L	Weed Science lab	1
				PS	462	Environmental Soil Management	2
				PS	462L	Environmental Soil Management lab	1
						Any 200 level or above selected from AST, CSC, ET, GEOG, DSCI, ENTR, PS, HO, ME, CE, BADM, ECON, FIN, AS, AGECE	6
						Data & Analytics Emphasis	21
						Select 21 credits from the following list	
				BADM	459	Analytics	3
				GEOG	270	Introduction To Small Uncrewed Aircraft Systems	3
				GEOG	280	Introduction to Remote Sensing	3
				GEOG	372	Introduction to GIS	2
				GEOG	372L	Introduction to GIS lab	1
				GEOG	483	UAS Remote Sensing	2
				GEOG	483L	UAS Remote Sensing lab	1

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs	Pref.	Num.	Title	Cr. Hrs
				INFO	101	Intro To Informatics	3
				INFO	102	Data Ethics	3
				STAT	101	Introduction to Data Science	3
				STAT	410	SAS Programming	3
				STAT	414	Basic R Programming	1
						Any 200 level or above selected from AST, CSC, ET, GEOG, DSCI, ENTR, PS, HO, ME, CE, BADM, ECON, FIN, AS, AGECE	6
Supporting Coursework			16	Supporting Coursework			0
AST	342	Applied Electricity	2	AST	342	Applied Electricity	2
AST	342L	Applied Electricity Lab	1	AST	342L	Applied Electricity Lab	1
BOT	201	General Botany	3	BOT	201	General Botany	3
BOT	201L	General Botany Lab	0	BOT	201L	General Botany Lab	0
CHEM	120	Elementary Organic Chemistry	2	CHEM	120	Elementary Organic Chemistry	2
CHEM	120L	Elementary Organic Chemistry Lab	1	CHEM	120L	Elementary Organic Chemistry Lab	1
PHYS	101	Survey of Physics	4	PHYS	101	Survey of Physics	4
PHYS	101L	Survey of Physics Lab	0	PHYS	101L	Survey of Physics Lab	1
STAT	281	Introduction to Statistics	3	STAT	281	Introduction to Statistics	3
Electives			4	Electives			6
Summary of Credits in Precision Agriculture (B.S.)							
System General Education Requirements			31	System General Education Requirements			31
Major Requirements			69	Major Requirements			83
Supporting Coursework			16	Supporting Coursework			0
Electives			4	Electives			6
Total number of hours required for major			104	Total number of hours required for major			99
Total number of hours required for degree			120	Total number of hours required for degree			120

Academic Requirements*Current:*

Students must earn at least a C grade in each major required class and must earn at least a 2.5 cumulative GPA in the major required classes including PS 213, PS 213L, and ABS 475.

Proposed:

Students must earn at least a C grade in each major required class and must earn at least a 2.5 cumulative GPA in the major required classes including PS 213, PS 213L, and **PRAG 475**.

8. Explanation of the Change:

The following changes were identified for the Precision Agriculture major:

- Added emphasis areas in Machinery Systems, Cropping Systems, and Data and Analysis. Students will select 21 credits from one of the emphasis areas. In the current Precision Agriculture program, students take courses in agronomy, electronics, farm machinery, and data management. In completing a 5-year program review and visiting with PRAG graduates, the program determined it would be beneficial to allow students to choose an area of focus within the major. Graduates typically end up in one of three focus areas. Those areas are: 1. Working with farm equipment for equipment manufacturers or equipment dealerships to develop and support the farm machinery industry. 2. Working for ag cooperatives such as Agtegra, Wilbur-Ellis, etc. to support and improve crop production practices. 3. Collecting, analyzing and interpreting large volumes of data to optimize production. A large percentage of students also come into the Precision Agriculture major as freshman with a career goal of working within one of the focus areas listed above. For this reason, emphasis areas have been added which will

allow students to focus a larger portion of their studies by choosing courses that will strengthen their skills within their chosen focus area. The following courses were removed from the list of major requirements and placed within an emphasis area. The purpose of this is summarized above.

- Courses moved to the Machinery Systems Emphasis elective list
 - AST 313-313L Farm machinery Systems Management
 - PRAG 345 Principles and Implications of Chemical Application Systems
- Courses moved to the Cropping Systems Emphasis elective list
 - PRAG 410-410L Soil geography and land Use Interpretation
 - PS 462-462L Environmental Soil Management and Lab
 - PS 223-223L Principles of Plant Pathology and Lab
 - PS 405-405L Entomology and Lab
 - PS 407-407L Insect Pest management and lab
 - PS 445-445L Weed Science and Lab
 - AST 333-333L Soil and Water Management and Lab
- CHEM 120-120L Elementary Organic Chemistry (2, 1 cr.) and PHYS 101-101L Survey of Physics and Lab have been removed from the required course list for all PRAG students and put into specific emphasis areas. All cropping systems emphasis students will be required to take CHEM 120-120L and all Machinery Systems emphasis students will be required to complete PHYS 101-101L. These courses align with the content area of study as well as prerequisites for courses within the respective emphasis areas.
- Removed ABS 203 Global Food Systems as a required SGR #3 course to allow students more flexibility in meeting their System General Education requirements.
- Replaced ABS 475 Integrated Natural Resource Management (3 cr.) with PRAG 475 Senior Capstone (3 cr.). ABS 475 is currently utilized by multiple departments as a capstone course. PRAG 475 will better service students in the program and eliminate confusion regarding which ABS 475 section to select.
- Revised the requirement for students to choose either AST 426-426L Technology applications in Agriculture (2, 1) and PRAG 428 Use of Soil and Plant Sensors (3 cr.). The program has changed this to require students to take both courses. Technology has advanced so rapidly in agriculture and students need course material that covers all new technology and how to assess its value, implement the technology in production agriculture, and support those systems. Sensor use has expanded and many of the sensors used in crop production are being utilized by farm machinery to apply a product. For this reason, all students will take both courses.
- Added PRAG 285 Agricultural Computations (2 cr.) to the required coursework. Industry has indicated students need to better understand data and statistics and utilization of Microsoft excel to do basic management practices as well as statistical analysis.