AGENDA ITEM NO: 12.1

UNIVERSITY COUNCIL

ACADEMIC PROGRAMS COMMITTEE

REQUEST FOR DECISION

PRESENTED BY:	Alison Oates, chair, Academic Programs Committee
DATE OF MEETING:	June 16, 2022
SUBJECT:	**Degree-level certificate in Precision Agriculture**
MOTION:	That Council approve the degree-level Certificate in Precision Agriculture in the College of Agriculture and Bioresources, effective September 2023.

PURPOSE:
University Council has the authority to degrees and degree-level programs.

CONTEXT AND BACKGROUND:
The College of Agriculture and Bioresources is proposing a degree-level certificate in Precision Agriculture. This 15cu certificate program will introduce students to precision agriculture, allowing them to develop skills with GIS programs and to understand what drives spatial and temporal differences in crop yields. With a variety of courses available that can serve as electives in this program, students will have the opportunity to gain sub-discipline specific skills and knowledge in precision agriculture. The program will have three required courses, one of which is a capstone course.

This certificate program is aimed at students currently completing a degree program and students may enter the program from partner sub-disciplines in their second year of study. The college anticipates enrollment of 30 students in total, with 15 graduating annually. It is anticipated that the majority of students will be from the College of Agriculture and Bioresources, there may be some interest in other subspecialties outside of the college, such as geography.

This certificate program will help students gain experience with and knowledge of tools that manage crop production and to support continued technological advances in agriculture.

CONSULTATION:
The Academic Programs Committee reviewed the proposal for this new program at its May 11, 2022 meeting. The committee were supportive of the program and were pleased with the consultation that happened both with impacted colleges as well as with industry about the content of the certificate program. The committee voted to recommend that Council approve this program.

ATTACHMENTS:

1. Proposal for New Certificate in Precision Agriculture

PROPOSAL IDENTIFICATION

Title of proposal: New Certificate Program: Certificate in Precision Agriculture

Degree(s):

Field(s) of Specialization: Precision Agriculture

Level(s) of Concentration: Certificate

Option(s):

Degree College: Agriculture and Bioresources

Contact person(s) (name, telephone, fax, e-mail):

Steve Shirtliffe, 966-4959 (office), (306) 270-5647 (mobile), steve.shirtliffe@usask.ca

Proposed date of implementation: Sept 2023

Proposal Document

Please provide information which covers the following sub topics. The length and detail should reflect the scale or importance of the program or revision. Documents prepared for your college may be used. Please expand this document as needed to embrace all your information.

1. Academic justification:

a. Describe why the program would be a useful addition to the university, from an academic programming perspective.

Agriculture is at the core of civilization as it provides food for humanity. As an industry, it also occupies the largest land area of any on the planet. To achieve food security while keeping the planet healthy, crop production from the existing land base must be increased in a sustainable way. Tools now exist to understand crop production and to manage it precisely. Satellites can provide near real-time imagery of fields that can be used to monitor crop growth. Farm machinery now routinely steers itself and the levels of inputs can be changed within a field to precisely deliver the optimal rate to the crop. This variable rate technology has resulted in both economic and environmental benefits as more crops receive the optimum level of inputs, thereby increasing crop yields while avoiding excess nutrients which can result in environmental pollution. These technological advances have resulted in a precision agriculture industry with some of the world's leading companies based in western Canada including CropPro, Nutrien/Echelon and Farmers Edge. This industry already employs University of

Saskatchewan graduates from Agriculture, Computer Science and Engineering to meet the demand. In addition to the industrial activity in this area, the University of Saskatchewan has become a centre for precision agriculture research. The Canada First Research Excellence Fund (CFREF) resulted in the Plant Phenotyping and Image Research Centre (P^2IRC), which brought together researchers from different colleges across campus. A Western Economic Diversification Grant for the Omics and Precision Agriculture Laboratory (OPAL) provided equipment for use in this area. The Crop Imaging Laboratory has developed several collaborative research projects utilizing both satellite and Unpiloted Aerial Vehicles (UAVs) as tools in Precision Agriculture. Finally, a search is being initiated for a Canada Research Chair in Digital Agriculture/Big Data in the College of Agriculture.

The Certificate structure of this program will allow students to gain knowledge and to develop experiential skill in precision agriculture. This will differentiate them in the marketplace by directly targeting the core skills necessary for employment in the precision agriculture industry. We held an Industry/Academia Precision Ag Certificate Workshop to refine the goals of the certificate (see attached report). The Precision Ag workshop was well attended by industry and received unqualified support. This workshop was instrumental in formulating this certificate outlined in this application. We believe that a Precision Agriculture Certificate will be timely and well subscribed.

b. Giving consideration to strategic objectives, specify how the new program fits the university signature areas and/or integrated plan areas, and/or the college/school, and/or department plans.

This proposed interdisciplinary certificate fits well within the University of Saskatchewan's signature area of *Agriculture – Food and Bioproducts for a Sustainable future*. Sustainable crop production is a key area of precision agriculture as it optimizes crop inputs to efficiently produce food and ensure food security.

The interdisciplinary certificate also aligns with the signature area of *Water Security-Stewardship of the World's Freshwater Resources.* As Saskatchewan has a semi-arid climate, the most important limitation to crop growth water. By understanding water supply and the water use efficiency of crops we can ensure that water is managed optimally in rainfed and irrigated cropping systems.

The University Plan and Vision document are reflected in the Precision Agriculture Certificate as it "*uses interdisciplinary and collaborative approaches to discovery*". As precision agriculture relies on the fusion of several different disciplines, it has at its core interdisciplinary and collaborative approaches. Furthermore, the practice of precision agriculture is still evolving and key participants in the journey are at the University of Saskatchewan. Indeed, the awarding of the CFREF grant resulting in the creation of P^2IRC first brought together the participants in the

precision agriculture area. Furthermore, Saskatchewan and the prairies are home to a large and innovative precision agriculture industry.

Many of the guiding principles of the 2025 University of Saskatchewan Plan are again reflected in the Precision Agriculture certificate. The certificate is designed to promote *Courageous Curiosity* by bringing students together to solve problems. The multi-disciplinary structure of the certificate and the emphasise on team building will ensure that *Boundless Collaboration* exists both with the students and the faculty. All of this will result in *Inspired Communities* where students can explore ways of both increasing productivity and reducing environmental harm.

Indigenization is extremely important for the area of precision agriculture as the land that is farmed was originally utilized by First Nations groups for millennia before the arrival of Europeans. Indigenous students who have an interest in land management may be interested in this certificate.

- ***c. Is there a particular student demographic this program is targeted towards and, if so, what is that target? (e.g., Aboriginal, mature, international, returning)***

This certificate program will target students from all of partner disciplines. It is anticipated that this program will attract students in general who are interested in digital technology as it applies to agriculture. Within the partner sub-disciplines, we anticipate the following groups will be interested:

- Technologically oriented students
- Students who desire employment in precision agriculture industry
- Indigenous students interested in land management

This certificate program is partially based on the results of a needs assessment workshop that was funded and facilitated by a Curriculum Innovation Fund from the Gwenna Moss Centre for Teaching and Learning. The in-person needs assessment workshop invited researchers and industry representatives from the precision agriculture industry to the University of Saskatchewan. The goal of this workshop was to bring faculty together for an initial discussion regarding identifying a shared vision for a Precision Farming certificate (cross-college) followed by a facilitated workshop with industry leaders to consult with leaders and identify industry needs. We used this workshop to look for ideas on what industry and research thought the best direction for precision agriculture research, and to identify possible new course development that may be required as well as gaps in instruction for this proposed program.

Following the successful introduction of this certificate program, we are planning to work towards developing it as a post-diploma certificate program as well. This would expand the target learners to those that are already in the work force.

d. What are the most similar competing programs in Saskatchewan, and in Canada? How is this program different?

There are no competing programs at any U15 Universities or top tier Agriculture Universities in Canada. There are two competing programs at regional agricultural universities in Alberta. Olds College has a two-year Diploma in Precision Agriculture – Techgronomy, which integrates technology with agronomy at the diploma level. Olds also offers a 8-month post-diploma certificate in Agriculture Technology Integration, which trains students at a technician level on aspects of technology integration in precision agriculture. Lakeland College offers a three-year Bachelor of Agriculture Technology. This program offers courses in Geographic Information Systems, remote sensing, and precision agriculture in addition to courses in agronomy. Finally, Lethbridge University appears to be developing a program in Precision Agriculture as they just posted an advertisement for three instructors to teach in this area.

This proposed certificate program differs from the other programs in both the level of its content and the certificate structure. The philosophy behind the proposed Precision Agriculture Certificate is to focus on educating the students in interpreting data from precision agriculture to allow for agronomic decisions to be made. We are avoiding being too specific in teaching individual products or technologies and instead we will focus on the scientific principles that underpin precision agriculture and how these generic technologies can be used to better inform crop management decisions that will be economically and environmentally beneficial. The proposed Precision Agriculture Certificate is also unique as it is multi-disciplinary. Students from diverse backgrounds including computer science, agronomy, and engineering, will take this certificate together. The students will be exposed to differing perspectives and we will encourage them to form teams that will foster cross-discipline communication.

2. Admissions
    a. What are the admissions requirements of this program?

Admission Qualifications
Regular Admission

- Completion of at least 24 credit units of post-secondary coursework
- Minimum average of 70% on 18 or more transferable credit units or the cumulative weighted average from a recognized and/or accredited post-secondary institution; average calculated on all attempted courses (without breaking up an academic session) which are transferable to the University of Saskatchewan.
- Proficiency in English

Selection Criteria

- Regular admission: Academic average—100% weighting
    - Average is calculated on 18 or more transferable credits

Categories of Applicants
Regular Admission

- Admission is based on the successful completion of at least 18 credit units of transferable university-level coursework at a recognized and/or accredited post-secondary institution, with an average of at least 70%.

3. Description of the program

a. What are the curricular objectives, and how are these accomplished? Copy from existing plans

- To introduce students to precision agriculture
- Students will understand the drivers of spatial and temporal variability in crop production
- Students will understand the methods that can be used to develop management zones for variable rate crop input application
- Students will develop skills in GIS programs
- Students will develop problems solving skills within a group context to allow them to critically evaluate information sources and data to develop solutions

All these skills will be taught within an inter-disciplinary context with students from the partner sub-disciplines. As precision agriculture is by nature multidisciplinary, students from the different sub-disciplines will bring differ skills and perspectives to the certificate. For example, an agriculture business student would focus on the economics of precision agriculture, whereas a computer science student would focus on the data analytic questions. Nevertheless, all students will understand the primary objectives listed above.

Students completing this certificate will be expected to:

- Understand the basics of precision agriculture
- Understand what drives spatial and temporal differences in crop yield
- Utilize precision agriculture tools and analytic techniques within a GIS system
- Utilize data to solve precision agriculture problems
- Work effectively in a diverse team to generate precision agriculture solutions
- Be effective and respective communicators

- *b. Describe the modes of delivery, experiential learning opportunities, and general teaching philosophy relevant to the programming. Where appropriate, include information about whether this program is being delivered in a distributed format.*

Modes of delivery: We plan to deliver this program primarily using an on-campus model for course offerings as many of the courses are pre-existing and control over the mode of delivery is set by the course's providers. Nevertheless, it is our intention to eventually expand the offering of this certificate to a post degree certificate. At that time in the future, we will offer a suite of courses that can be accessed either remotely or though hybrid model to allow students

to take some of their credit units remotely. All courses will be offered annually and during the fall and winter terms.

Experiential learning opportunities:
Several courses in the precision agriculture program will provide experiential learning. The required introductory course will have a laboratory that introduces precision agriculture technology and provides hands on experience with the sensors, the fields, and the analytic tools. The required GIS (GEOG 222.3) course will provide the backbone of the experiential learning for analysis of spatial precision agriculture data for the students. In this course students will develop the skills to analyze spatial datasets and imagery within a geographic information system.

Within the optional courses there will be more opportunities for experiential education, as many of the optional courses have practicum sections.

The capstone course in this program (PLSC 402) is designed to allow experiential learning. In it the students will work in multidisciplinary teams to develop precision agriculture solutions to real life clients. We will collaborate with industry, production (farmers) and academic partners to provide real life data that the groups of students will work with. This will be combined with tours to land that will allow real life understanding of the principals involved.

General teaching philosophy: The mission of the Precision Agriculture Certificate is to develop student's theoretical knowledge and applied skills in the area of precision agriculture. To do this we will develop both the soft and hard skills students need to understand and practice this discipline. The multi-disciplinary foundations of precision agriculture are recognized explicitly in this certificate in the structure of the program which reaches out to the subdisciplines for students. These students will be brought together in teams so that they learn how to communicate with other disciplines and work effectively in a diverse team to generate precision agriculture solutions.

c. Provide an overview of the curriculum mapping.

The following is our curriculum mapping of the proposed program to our learning objectives:

		Course Name	Notes	Exp Learning		Understand Prec Ag	Spatial & temp var crops &soils	Data to solve prob	Diverse team to solve Prec Ag
				Group activities	Lab practicum/ Tutorial				
PLSC	202.3	Introduction to Precision Agriculture	Required		X	X	X	X	
GEOG	222.3	Introduction to Geographic Information Systems	Required		X			X	
PLSC	402.3	Advanced Precision Agriculture	Required	X	X	X	X	X	X
AGRC	111.3	Discovery in Plant and Soil Sciences	Required		X		X		
PLSC	201.3	Field Crops of Western Canada	Elective		X		X		
PLSC	222.3	Introduction to Field Crops	Elective		X		X		
PLSC	260.3	Principles of Plant Protection	Elective				X		
PLSC	335.3	Field Crop Disease Management	Elective	X	X		X		
PLSC	340.3	Weed Biology and Ecology	Elective		X		X		
PLSC	450.3	Applied Entomolgoy	Elective	X	X		X		
PLSC	382.3	Introduction to Field Scouting	Elective	X	X		X		
PLSC	401.3	Sustainable Crop Production	Elective	X	X	X	X		
PLSC	418.3	Management of Arable Grasslands	Elective	X					
ENVS	220.3								
SLSC	232.3	Soil Genesis and Classification	Elective				X		
SLSC	240.3	Agricultural Soil Science	Elective		X				
SLSC	220.3	Environmental Soil Science	Elective				X		
SLSC	312.3	Soil Fertility and Fertilizers	Elective		X		X	X	
SLSC	322.3	Soil Physics	Elective		X			X	
SLSC	313.3	Soil Chemistry	Elective						
SLSC	343.3	Soil Microbiology	Elective		X				
GEOG	225.3	Hydrology of Canada	Elective		X		X		
GEOG	290.3	Field Methods and Laboratory Methods	Elective						
GEOG	302.3	Quantitative Methods in Geography	Elective	X	X		X	X	
GEOG	322.3	Introduction to Geographic Information Systems	Elective		X			X	
GEOG	323.3	Remote Sencing	Elective		X		X	X	
GEOG	423.3	Advance Remote Sencing	Elective		X		X	X	
GEOG	390.3	Methods in Hydrometeorology	Elective		X		X		
AREC	220.3	History of Indigenous Agriculture in Canada	Elective						
AREC	222.3	Introduction to Farm Business Management	Elective		X				
AREC	272.3	Introduction to Agricultural Economics	Elective					X	
AREC	315.3	Application of Microeconomic Theory to Agricult	Elective		X			X	
AREC	354.3	Agribusiness Management Information Systems	Elective					X	
AREC	361.3	Intermediate Statistics and Decision Making	Elective						
AREC	420.3	Operations Management for Agriculture	Elective		X			X	
AREC	459.3	The Economics of Agricultural Innovation	Elective						
CMPT	214.3	Programming Principles and Practice	Elective		X				
CMPT	317.3	Introduction to Artificial Intelligence	Elective		X			X	
CMPT	350.3	Web Programming	Elective		X				
CMPT	355.3	Theory and Application of Data Bases	Elective		X			X	
CMPT	384.3	Information Visualizaion	Elective		X			X	
CMPT	423.3	Machine Learning	Elective					X	
CMPT	436.3	Mobile and Cloud Computing	Elective						
CMPT	481.2	Human Computer Interaction	Elective						
CMPT	487.3	Image Processing and Computer Vision	Elective					X	
CMPT	489.3	Deep Learning and Applications	Elective					X	
CE	202.3	Spatial Analysis and Engineering Drawings	Elective		X			X	
CE	295.3	Design Project	Elective	X	X			X	
CE	319.3	Hydrology	Elective				X	X	
CE	328.3	Fundamental of Soil Mechanics	Elective				X		
BLE	313.3	Instrumentation	Elective		X				
ENVE	212.3	Physical Principles of Plant Biosystems	Elective		X		X		
ENVE	395.3	Environmental Engineerin Design Project	Elective		X			X	
ENVE	432.3	Land Management and Reclamation	Elective		X		X		
ME	214.3	Introdcution to Materials and Manufacturing	Elective						
ME	229.3	Introdcution to Mechanical Engineering Design	Elective	X	X			X	
ME	329.3	Collaborative Design and Manufacturing	Elective	X	X			X	

- ***d. Identify where the opportunities for synthesis, analysis, application, critical thinking, problem solving are, and other relevant identifiers.***

Based on our curriculum mapping, there are several classes that provide experiential learning in terms of group assignments, tutorials or laboratory practicum. The core courses of the program provide the base knowledge and tools to work effectively within a precision agriculture team. The students will bring a suite of skills and knowledge to the program depending on which sub-discipline that they are from. Regardless of the sub-discipline the two precision agriculture courses (PLSC 202 and PLSC 402) will "book-end" the certificate to first introduce the students to the area of precision agriculture and finally to provide an integrative space in which they can utilize both shared and sub-discipline specific precision agriculture skills and knowledge. Within each of these courses, students will work in multidisciplinary teams to share knowledge and develop solutions.

- ***e. Explain the comprehensive breadth of the program***.

The following is a proposed course profile for a student in the Precision Agriculture Certificate.

Required Courses:
Introductory course: PLSC 202.3 Introductory Precision Agriculture
Universal techniques course: GEOG 222.3 Introduction to Geographic Information Systems
Capstone Course: PLSC 402.3 Advanced Precision Agriculture

Electives:
Choose 9 cu from the following electives:

PLSC 201.3, PLSC 222.3, PLSC 260.3, PLSC 335.3, PLSC 340.3, PLSC 382.3, PLSC 401.3, PLSC 418.3, PLSC 450, SLSC 232.3, SLSC 240.3, EVSC 220.3, SLSC 312.3, SLSC 322.3, SLSC 313.3, SLSC 342.3, GEOG 225.3, GEOG 290.3, GEOG 302.3, GEOG 322.3, GEOG 323.3, PLSC 475, GEOG 423.3, GEOG 390.3, AREC 220.3, AREC 222.3, AREC 272.3, AREC 315.3, AREC 354.3, AREC 361.3, AREC 420.3, AREC 459.3, CMPT 214.3, CMPT 317.3, CMPT 350.3, CMPT 355.3, CMPT 384.3, CMPT 423.3, CMPT 436.3, CMPT 481.2, CMPT 487.3, CMPT 489.3, CE 202.3, CE 295.3, CE 319.3, CE 328.3, BLE 313.3, ENVE 212.3, ENVE 395.3, ENVE 432.3, ME 214.3, ME 229.3, ME 329.3

- ***f. Referring to the university "Learning Charter", explain how the 5 learning goals are addressed, and what degree attributes and skills will be acquired by graduates of the program.***

Discovery goals:
Students taking part in this program will learn from a diverse interdisciplinary group of instructors employing a variety of teaching and learning methods. Students will learn both the fundamentals and the skills necessary to practice Precision Agriculture. They will also develop problem solving skills and critical thinking skills though group projects and laboratory exercises.

The capstone course (PLSC 402.3 Advanced Precision Agriculture) course will allow students to integrate knowledge from their specific subdiscipline and to apply real world Precision Agriculture solutions to increase both the sustainability and production of crops.

Knowledge goals: Students who take the Precision Agriculture Certificate will all develop a knowledge of the theory and practice of Precision Agriculture. The common specific knowledge they will ascertain has been outlined in this application and consist of the knowledge of precision agriculture from both that of the subdisciplines to that of the whole recognizing the multidisciplinary nature. the perspective of the subdisciplines. The knowledge of the students will be enriched by the students from different subdisciplines. Students will be placed in teams with a diversity of subdisciplines in order to enhance this organic student to student knowledge transfer.

Integrity goals: The diverse interdisciplinary structure of this program combined with the group learning methods will expose and develop integrity within the students.

Skills goals: Students will develop common and sub-discipline specific skills because of this certificate. The common skills will include GIS skills as applied to precision managing of agricultural land. Within their specific subdiscipline, they will develop skills that are applied to the area of precision agriculture; for example, students in Computer Science will develop skills in image analysis, and data handling, whereas Geography students will bring skills in remote sensing and Agronomy students will have skills in crop management. By bringing students together in the introductory and capstone course, these skills will be blended by working in groups and sharing knowledge. This interdisciplinary work will also develop skills in tolerance, appreciation and perspective in the students.

Citizenship goals: Graduates from this certificate will have learned both soft and hard skills that enhance their citizenship following graduation. The problem solving and data analytic skills will allow them to make logical decisions. The multidisciplinary group activities will foster values of respect and understanding because of the diverse multicultural background of the students.

- ***g. Describe how students can enter this program from other programs (program transferability).***

Students may enter this program directly from the partner subdisciplines in their second year of university.

- ***h. Specify the criteria that will be used to evaluate whether the program is a success within a timeframe clearly specified by the proponents in the proposal.***

The Precision Agriculture Certificate will be delivered with two new courses both to be developed in 2022. We aim to have the program in place by September 2023 and the two new

courses will have been developed by that time. The professor developing it has been given teaching relief in the winter term of 21/22 to develop the course.

Measures of success will include a) tracking student enrolment and completion (we are aiming for a total of approximately 30 students enrolled in the certificate with 15 students graduating annually); b) conduct a survey of graduating students to understand the perceived value of the certificate; and c) conduct a survey of workplace stakeholders of the quality of graduates being produced. Following a complete cycle of the program the Precision Agriculture committee will meet to access the success and address program needs.

i. If applicable, is accreditation or certification available, and if so how will the program meet professional standard criteria. Specify in the budget below any costs that may be associated.

Not applicable.

4. Consultation

- ***a. Describe how the program relates to existing programs in the department, in the college or school, and with other colleges. Establish where students from other programs may benefit from courses in this program. Does the proposed program lead into other programs offered at the university or elsewhere?***

The Precision Agriculture certificate is an accessible credential that will allow students from several sub-disciplines to gain knowledge and experience in the multidisciplinary field of precision agriculture. The introductory core course created for it (PLSC 202, Introductory Precision Agriculture) are designed for the certificate but could benefit students not actively pursuing the certificate by giving them an introduction to precision agriculture. This course may be of interest for students from other disciplines although it will have one prerequisite, AGRC 111.

As the capstone course for the certificate (PLSC 402, Advanced Precision Agriculture) will have the introductory course as well as GEOG 222.3 as prerequisites, it is anticipated that any students enrolled in it would be pursuing the precision agriculture certificate as they would more than likely have courses from the restricted elective list that would make them eligible. This certificate is terminal in nature does not lead directly into any other programs at the USask or elsewhere.

- ***b. List units that were consulted formally, and provide a summary of how consultation was conducted and how concerns that were raised in consultations have been addressed. Attach the relevant communication in an appendix.***

All partnering sub-disciplines have taken part in planning this certificate through the Precision Agriculture Certificate committee which includes member from Agriculture and Bioresources,

Computer Science, Engineering and Geography. As a result of this planning, we do not anticipate that these courses will place a stress on the departmental home of these courses.

- ***c. Proposals that involve courses or other resources from colleges outside the sponsoring unit should include evidence of consultation and approval. Please give special consideration to pre- and co-requisite requires when including courses from other colleges.***

The only required class outside of the sponsoring unit is GEOG 222. Dr. Xulin Gou is the instructor of this class and has agreed to take any additional students that require this course for the certificate. All students will enroll in this certificate this certificate from their subdiscipline, and it is anticipated that they will choose courses from their subdisciplines. Thus, the certificate should not affect sub-discipline prerequisites. Care had been taken to ensure that there are ample restricted electives available in each of the sub-disciplines.

- ***d. Provide evidence of consultation with the University Library to ensure that appropriate library resources are available.***

Our respective College librarians (Virginia Wilson – Agriculture and Bioresources) has been consulted in the process of evaluating to determine if our resources are sufficient to meet the needs of this new program. Two online texts have been purchased for use in the two required classes.

- ***e. List other pertinent consultations and evidence of support, if applicable (e.g., professional associations, accreditation bodies, potential employers, etc.)***

A Gwenna Moss sponsored needs assessment workshop was held as described in this application. There was overwhelming support from the precision agriculture industry and scientific partners that attended. The results of this workshop are attached to this document.

5. Budget

- ***a. How many instructors will participate in teaching, advising and other activities related to core program delivery (not including distribution/ breadth requirements or electives)? (estimate the percentage time for each person).***

This certificate will engage several faculty and staff from the participating sub-disciplines. The faculty and staff that instruct the core classes of the certificate will be most active in the delivery of the certificate. Following the initial offering by Dr. Shirtliffe, an instructor from the College of Agriculture and Bioresources will teach PLSC 202 Introductory Precision Agriculture. Dr. Shirtliffe will also develop PLSC 402 while on Sabbatical from 2022/23 and deliver the course for the first time in 2023/24 (40% of teaching load). Dr. Xulin Gao is already the professor for GEOG 222 and the additional students that take this course will result in an

incremental increase in student contact hours. Dr. Shirtliffe will assume advising for this certificate (5% of teaching load).

It is anticipated that the electives will not result in any change in teaching load for the instructors and staff from the partner sub-disciples as these courses are pre-existing courses within each of the disciplines.

- ***b. What courses or programs are being eliminated in order to provide time to teach the additional courses?***

No courses or programs are being eliminated.

- ***c. How are the teaching assignments of each unit and instructor affected by this proposal?***

This certificate will only affect the teaching assignment of Dr. Shirtliffe in Plant Sciences. A College of Agriculture and Bioresources lecturer (Dr. Sirajum Munira) has recently been hired who is instructing a course formerly assigned to Shirtliffe (PLSC 375).

- ***d. Describe budget allocations and how the unit resources are reallocated to accommodate this proposal. (Unit administrative support, space issues, class room availability, studio/practice rooms laboratory/clinical or other instructional space requirements).***

It is not anticipated that significant extra resources beyond those outlined above will be required to accommodate this course.

- ***f. If this is an interdisciplinary program, please indicate whether there is a pool of resources available from other colleges involved in the program.***

Although this will be an interdisciplinary certificate, it will rely on instructors and resources that are currently available for delivery of their respective programs. Some incremental costs of delivering larger classes and labs may be incurred.

- ***g. What scholarships will students be able to apply for, and how many? What other provisions are being provided for student financial aid and to promote accessibility of the program?***

Students will be eligible for all University and College level awards within their respective sub-discipline. It is anticipated that Precision Agriculture Industry will sponsor an award for the top student from this certificate.

For college level awards, eligibility will be dependent on award conditions as determined by the respective Student Finance and Awards adjudication committees.

- ***h. What is the program tuition? Will the program utilize a special tuition model or standard tuition categories? (The approval authority for tuition is the Board of Governors).***

The program uses standard tuition categories and students pay tuition based on tuition category associated with the course. The two new courses, PLSC 202 and PLSC 402, are tuition category 13.

- ***What are the estimated costs of program delivery, based on the total time commitment estimates provided? (Use TABBS information, as provided by the College/School financial officer)***

The cost of program delivery will, as indicated previously, experience relatively low costs associated with TA and laboratory support that would be proportional to increases in student numbers in the program. Additional instructional costs will be incurred for the two new PLSC courses, as outlined below:

Estimated costs of program delivery:

	2023/24	2024/25
Course instruction	25,000	50,000
Material and supplies	659	1,228
Teaching assistants	861	1,450
Total Agbio costs	26,519	52,678

- ***j. What is the enrolment target for the program? How many years to reach this target? What is the minimum enrolment, below which the program ceases to be feasible ? is there a minimum. What is the maximum enrolment, given the limitations of the resources allocated to the program***

The enrolment target for this new certificate is ultimately 30 students per year. We anticipate this enrolment will have approximately 25 students from the College of Agriculture and Bioresources and 5 students from the partner subdisciplines. We anticipate that the first year will probably attract 10-15 students in total.

- ***k. What are the total expected revenues at the target enrolment level, separated into core program delivery and distribution/breadth requirements or electives? What portion of this expected revenue can be thought of as incremental (or new) revenue?***

Tuition revenue will be shared among colleges according to the TABBS model. The tuition noted here is only for students registered in the Precision Agriculture Certificate. It is expected that the new courses will attract additional enrolment of students in existing programs, up to 35 more students for PLSC 202 and up to 15 more students to PLSC 402. In addition, we estimate 10 of the certificate students will be new to BSA and BSc programs, and will contribute approximately $60,000 per year in tuition over and above the amount reflected in the program numbers.

	2024/25
Student Data (FTE)	
Total Yr 1 students	15.00
Total Yr 2 students	15.00
Total program	30.00
Tuition rate per credit unit	
AgBio Classes	231.30
Arts & Science	234.40
Engineering	252.90

Program tuition generated	**2024/25**
AgBio Classes	47,359
Arts & Science	13,712
Engineering	1,707
Total Tuition	62,778

Program tuition generated	
Core Program	31,365
Electives and restricted electives	31,413
Total	62,778

Given current assumptions on students and course enrolment, approximately one-third of the tuition is considered new to the university.

- ***I. At what enrolment number will this program be independently sustainable? If this enrolment number is higher than the enrolment target, where will the resources come from to sustain the program, and what commitments define the supply of those resources?***

This program will be supported initially through the independent programming of the respective units, and thus any incremental gains in terms of enrolment will be absorbed into the respective unit.

- ***m. Proponents are required to clearly explain the total incremental costs of the program. This is to be expressed as: (i) total cost of resources needed to deliver the program: (ii) existing resources (including in-kind and tagged as such) applied against the total cost: and (iii) a listing of those resource costs that will require additional funding (including new in-kind support).***

As indicated above, some additional resources may be needed to cover increased enrolment in the courses; however, additional faculty are not required at the predicted intake level.

- ***n. List all new funding sources and amounts (including in-kind) and the anticipated contribution of each to offsetting increment program costs. Please identify if any indicated funding is contingent on subsequent approval by a funding authority and/or future conditions. Also indicate under what conditions the program is expected to be cost neutral. The proponents should also indicated any anticipated surpluses/deficits associated with the new program***

Instructional costs for the two new PLSC courses are $50,000 and resources are in place in the current college budget. Direct costs for teaching assistants, laboratories and supplies in AgBio are expected be about $2,768. Funding would be provided by the college based on its current budget formula.

A. Cohort of 5 new students taking the Precision Ag Certificate, registering in a degree program

	Student Year in Program			
	1	2	3	4
certificate core credit units		6	3	
certificate elective credit units		3	6	
other credit units	30	21	21	30
total CUE per student	30	30	30	30
number of students (new)	5	5	5	5
tuition rate per cue	$ 231.00	$ 231.00	$ 231.00	$ 231.00
TAs per 3 cue	$ 21.25	$ 21.25	$ 21.25	$ 21.25
materials & supplies per 3cue	$ 7.00	$ 7.00	$ 7.00	$ 7.00
headcount per student	$ 25.00	$ 25.00	$ 25.00	$ 25.00
Tuition				
certificate core credit units	-	6,930	3,465	-
certificate elective credit units	-	3,465	6,930	-
other credit units	34,650	24,255	24,255	34,650
Total tuition	34,650	34,650	34,650	34,650
TAs	1,063	1,063	1,063	1,063
materials & supplies	350	350	350	350
headcount	125	125	125	125
Instruction PLSC 202 and 402	-	25,000	-	25,000
Total cost	1,538	26,538	1,538	26,538
Net surplus/deficit	33,113	8,113	33,113	8,113

B. Per NOI -certificate enrolment of 15 students in each of two years, counting only the core courses

	year 1	year 2
certificate core credit units	6	3
certificate elective credit units		0
other credit units	0	0
total CUE per student	6	3
number of students (new)	15	15
tuition rate per cue	$ 231.00	$ 231.00
TAs per 3 cue	$ 21.25	$ 21.25
materials & supplies per 3cue	$ 7.00	$ 7.00
headcount per student	$ 25.00	$ 25.00

Tuition	20,790	10,395
TAs	638	319
materials & supplies	210	105
headcount	375	375
Instruction PLSC 202 and 402	25,000	25,000
Total cost	26,223	25,799
Net surplus/deficit	(5,433)	(15,404)

NOI has loss of 21,313

Slight variation intuition as NOI used average rate of core course which was slightly higher that $231.

difference between this and NOI is this includes costs on all three core courses; NOI included 2; NOI included cost on AgBio electives, this does not include electives.

C. Per NOI -certificate enrolment of 15 students in each of two years, counting only the core courses; note on e

	year 1	year 2
certificate core credit units	6	3
certificate elective credit units	3	6
other credit units	0	0
total CUE per student	9	9
number of students (new)	15	15
tuition rate per cue	$ 231.00	$ 231.00
TAs per 3 cue	$ 21.25	$ 21.25
materials & supplies per 3cue	$ 7.00	$ 7.00
headcount per student	$ 25.00	$ 25.00
Tuition	31,185	31,185
TAs	956	956
materials & supplies	315	315
headcount	375	375
Instruction PLSC 202 and 402	25,000	25,000
Total cost	26,646	26,646
Net surplus/deficit	4,539	4,539

Slight variation intuition as NOI used average rate of possible electives which was slightly higher that $231.

full program
9
9
102
120
20

10,395
10,395
117,810
138,600

4,250
1,400
500
50,000
56,150

82,450

full program
9
0
0
9
30

31,185	
956	
315	
750	
50,000	
52,021	
(20,836)	

ts

lectives tuition of additional $31,413

full program	increase from B
9	
9	
0	
18	
30	

62,370	31,185
	-
1,913	956
630	315
750	-
50,000	-
53,293	1,271
9,078	29,914

UNIVERSITY OF SASKATCHEWAN	**New Course Proposal & Creation Form**

1**. Approval by Department Head or Dean**

1.1 College or School with academic authority: **Agriculture and Bioresources**
1.2 Department with academic authority: **Plant Sciences**
1.3 Term from which the course is effective: **Fall 2022**

2. **Information required for the Catalogue**

2.1 Label & Number of course: **PLSC 202**
2.2 Academic credit units: **3**

2.3 Course Long Title (maximum 100 characters): **Introductory Precision Agriculture**
Course Short Title (maximum 30 characters): **Introductory Precision Agriculture**

2.4 Total Hours: Lecture **39**

2.5 Weekly Hours: Lecture **3**

2.6 Term in which it will be offered: **T1**

2.7 Prerequisite(s) or Corequisite(s): **AGRC 111.3; or permission of the instructor**

If there is a prerequisite waiver, who is responsible for signing it?
I – ***Instructor Approval***

2.8 Catalogue description (150 words or less):

This course will give students an introduction to precision agriculture as it relates to field crop production. Students will learn about the agronomy and technology of variable rate technology. The course will highlight the economic and environmental benefits of precision agriculture, as well as examining components of it, including soil and crop variability, global positioning systems, machinery automation, spatial analysis, unoccupied aerial vehicles (UAVs), and satellite imagery. The course will bring together these elements to allow students to evaluate precision agriculture services. This is the foundation course in the Precision Agriculture Certificate.

2.9 Do you allow this course to be repeated for credit?
No

3. **Please list rationale for introducing this course:**

Agriculture is at the core of civilization as it provides food for humanity. As an industry, it also occupies the largest land area of any on the planet. To achieve food security while keeping the planet healthy, crop production from the existing land base must be increased in a sustainable way. Tools now

exist to understand crop production and to manage it precisely. Satellites can provide near real-time imagery of fields that can be used to monitor crop growth. Farm machinery now routinely steers itself and the levels of inputs can be changed within a field to precisely deliver the optimal rate to the crop. This variable rate technology has resulted in both economic and environmental benefits as more crops receive the optimum level of inputs, thereby increasing crop yields while avoiding excess nutrients, which can result in environmental pollution. These technological advances have resulted in a Precision Agriculture industry with some of the world's leading companies based in western Canada including CropPro, Nutrien/Echelon and Farmers Edge. This industry already employs University of Saskatchewan graduates from Agriculture, Computer Science and Engineering to meet the demand. In addition to the industrial activity in this area, the University of Saskatchewan has become a centre for precision agriculture research.

This course will be the first required course for the proposed Precision Agriculture Certificate being developed at the University of Saskatchewan. It will be open to students from all colleges and will serve to introduce them to precision agriculture. It will provide foundational knowledge on how precision agriculture is practiced. Students will get an overview of the economic and ecological basis for precision agriculture and how information is used to develop variable rate crop input prescriptions. They will also develop an appreciation for the large data and analytical requirements to implement precision agriculture programs.

4. **Please list the learning objectives for this course:**
   1. **Understand the basis of spatial and temporal variability in crop yield and nutrient supply**
   2. **Understand the challenges and benefits of utilizing precision agriculture system**
   3. **Understand the basics of crop and soil sensors as well as data interpretation**
   4. **Understand methods to develop management zones for variable rate crop input application**
   5. **Be able to evaluate precision agriculture programs**

5. **Impact of this course**

   Are the programs of other departments or Colleges affected by this course? ***Yes***

   If so, were these departments consulted? (Include correspondence)) **Yes, the Precision Agriculture Certificate and required courses were discussed and planned by the Precision Agriculture Certificate committee, consisting of representatives of all departments expected to be impacted by this certificate including Plant Sciences, Soil Science, Agricultural and Resource Economics, Computer Science, Geography, and Mechanical Engineering. These representatives discussed the planning of the certificate and these classes with their respective departments.**

   Were any other departments asked to review or comment on the proposal? ***No***

6. **Other courses or program affected** (please list course titles as well as numbers)
   - 6.1 Courses to be deleted? ***None***
   - 6.2 Courses for which this course will be a prerequisite? ***PLSC 402 Advanced Precision Agriculture***
   - 6.3 Is this course to be required by your majors, or by majors in another program? ***This course is a required course for the proposed Precision Agriculture Certificate and will be a restricted elective for other PLSC majors.***

7. **Course outline**

   (Weekly outline of lectures or include a draft of the course information sheet.)

Week Number & Title	Content Topics
1. Introduction to Precision Agriculture	▪ Need for Precision Agriculture ▪ Environmental and Economic ▪ Examples of Precision Ag ▪ Supply and Demand Theory of Precision Ag
2. Understanding Causes of Temporal and Spatial Variability	▪ Crop requirements for growth and yield ▪ Soil Factors ▪ Weather factors ▪ Water factors
3. Satellite Based Position Systems and Machinery for Precision Agriculture	▪ Geographic Positioning Systems ▪ Machinery for Precision Ag ▪ Autosteer and Sectional Control systems ▪ Robotics ▪ Variable Rate Technology
4. Geographic Information Systems	▪ Vector and Raster Data ▪ Coordinate systems ▪ Components of GIS systems ▪ Spatial and temp ▪ Cloud based GIS systems Google Earth Engine
5. Remote Sensing for Precision Agriculture	▪ Principles of Electromagnetic sensing ▪ Spectral, Spatial, Temporal and Radiometric resolution ▪ Unoccupied Aerial Vehicles (UAVs) ▪ Satellite imagery and data ▪ Accessing Satellite imagery
6. Proximal Soil and Crop Sensing	▪ Crop Canopy Sensors ▪ Weather Stations ▪ Soil testing ▪ Soil sampling strategies ▪ Soil Electrical Conductivity
7. Yield Monitoring and Spatial Variation mapping	▪ Yield monitor principals/calibration ▪ Yield map cleaning and production ▪ Quality mapping ▪ Crop imagery mapping ▪ Crop biomass estimation ▪ Environmental interactions
8. Soil Variability Measurement and Management	▪ Soil Formation ▪ Variability in water availability ▪ Landscape positions ▪ Variable rate fertilization ▪ Nitrogen
9. Pest Management and seeding	▪ Precision spraying ▪ Variable rate seeding

	▪ Deep learning for pest identification
10. Crop Imaging for Precision Agriculture	▪ UAVs for precision agriculture ▪ Basic Image analysis ▪ Multispectral imaging ▪ Applications of neural networks in crop imaging
11. Data Analysis	▪ Cloud based data platforms ▪ On farm experimentation ▪ Data interpretation ▪ Big Data analytics in precision ag
12. Precision Agriculture other areas	▪ Precision animal feeding systems ▪ Precision grazing ▪ Identity preservation and tracking
13. Commercial Precision Agriculture Services	▪ Presentations of commercial precision agriculture services

8. **Enrolment**

8.1 Expected enrollment: ***50***

8.2 From which colleges ***Agriculture and Bioresources; Arts and Science; Engineering***

9. **Student evaluation**

Give approximate weighting assigned to each indicator (assignments, laboratory work, mid-term test, final examination, essays or projects, etc.)

9.1 How should this course be graded?
N – Numeric/Percentage
(Grade options for instructor: grade of 0% to 100%, IP in Progress)

9.2 Is the course exempt from the final examination? ***No***

10. **Required text**

Include a bibliography for the course.

Shannon, D.K., D.E. Clay, and N.R. Kitchen. 2018**. Precision Agriculture Basics**. ASA, CSSA, and SSSA, Madison, WI. (available as an e-book through USask library)
https://library.usask.ca/scripts/remote?URL=https://sundog.usask.ca/record=b5643457~S8

11. **Resources**

11.1 Proposed instructor: **Professor Steven Shirtliffe**

11.2 How does the department plan to handle the additional teaching or administrative workload? ***Following the initial offering of this course by Dr. Shirtliffe it will be offered by a College of Agriculture and Bioresources Lecturer.***

11.3 Are sufficient library or other research resources available for this course? ***Yes, the liaison librarian for Agriculture and Bioresources has been contacted and resources are available.***

11.4 Are any additional resources required (library, audio-visual, technology, etc.)? ***No***

12. **Tuition**

12.1 Will this course attract tuition charges? If so, how much? (use tuition category) ***Yes, Tuition Category 13***

12.2 Does this course require non-standard fees, such as materials or excursion fees? If so, please include an approved "Application for New Fee or Fee Change Form" http://www.usask.ca/sesd/info-for-instructors/program-course-preparation.php#course-fees. ***N/A***

Detailed Course Information

1. Schedule Types

Please choose the Schedule Types that can be used for sections that fall under this course:

Code	Description
LEC	Lecture

2. Course Attributes

Please highlight the attributes that should be attached to the course (they will apply to all sections):

2.1 NOAC No Academic Credit

0 Credit Unit courses that possess "deemed" CUs (Called Operational Credit Units). NOAC causes the system to roll 0 academic credit units to academic history.

2.2 For the College of Arts and Science only: To which program type does this course belong?

FNAR Fine Arts
HUM Humanities
SCIE Science
SOCS Social Science
ARNP No Program Type (Arts and Science)

Does this course satisfy one of the official college requirements:

ELWR – English Language Writing Requirement
ILRQ – Indigenous Learning Requirement
QRRQ – Quantitative Reasoning Requirement

3. Registration Information (Note: multi-term courses cannot be automated as corequisites)

3.1 Permission Required: N/A

3.2 Restriction(s): course only open to students in a specific college, program/degree, major, year in program N/A

3.3 Prerequisite(s): course(s) that must be completed prior to the start of this course N/A

3.4 Prerequisite(s) or Corequisite(s): course(s) that can be completed prior to or taken at the same time as this course: ***AGRC 111.3***

3.5 Corequisite(s): course(s) that must be taken at the same time as this course N/A

3.6 Notes: recommended courses, repeat restrictions/content overlap, other additional information

4. List Equivalent Course(s) here:

An equivalent course can be used in place of the course for which this form is being completed, specifically for the purposes of prerequisite and degree audit checking. Credit will be given for only one of the equivalent courses.

4.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be equivalent: N/A

*__Please note__: If the equivalent courses carry an UNEQUAL number of credit units, DegreeWorks will automatically enforce the following, unless otherwise stated:

- If a 3 credit unit course is considered to be equivalent to a 6 credit unit course, it will fulfill the 6 credit unit requirement and the student will not have to complete another 3 credit units toward the overall number of required credit units for the program.
- If a 6 credit unit course is considered to be equivalent to a 3 credit unit course, ALL 6 of the credit units may be used to fulfill the 3 credit unit requirement.

5. List Mutually-Exclusive Course(s) here:

Mutually exclusive courses have similar content such that students cannot receive credit for both.

5.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be mutually exclusive: N/A

***Please note:** SiRIUS cannot enforce a situation where the exclusion goes only one way.

6. Additional Notes:

UNIVERSITY OF SASKATCHEWAN	**New Course Proposal & Creation Form**

1. **Approval by Department Head or Dean**
   - 1.1 College or School with academic authority: **Agriculture and Bioresources**
   - 1.2 Department with academic authority: **Plant Sciences**
   - 1.3 Term from which the course is effective: **Fall 2023**

2. **Information required for the Catalogue**
   - 2.1 Label & Number of course: **PLSC 402**
   - 2.2 Academic credit units: **3**
   - 2.3 Course Long Title (maximum 100 characters): **Advanced Precision Agriculture**
     Course Short Title (maximum 30 characters): **Advanced Precision Agriculture**
   - 2.4 Total Hours: Lecture **39**
     Practicum **26**
   - 2.5 Weekly Hours: Lecture **3**
     Practicum **2**
   - 2.6 Term in which it will be offered: **T1**
   - 2.7 Prerequisite: **PLSC 202 and GEOG 222. One of PLSC 214.3, STAT 245.3 or GE 210.3 is strongly recommended.**

     If there is a prerequisite waiver, who is responsible for signing it?
     I – ***Instructor Approval***
   - 2.8 Catalogue description (150 words or less):

This course is the capstone course in the Precision Agriculture Certificate. It will allow students to integrate knowledge from their specific subdiscipline with real-world precision agriculture solutions to increase the sustainability and production of crops. Students will learn advanced concepts in precision agriculture and how to analyze spatial and temporal variability in crop production. They will utilize a variety of data, ranging from satellite imagery, soil topography and soil properties, to understand and develop variable rate prescriptions for crop inputs. Finally, students will apply this knowledge in diverse teams that utilize discipline-specific knowledge to solve real-world precision agriculture problems.

   - 2.9 Do you allow this course to be repeated for credit?
     No

3. **Please list rationale for introducing this course:**

Agriculture is at the core of civilization as it provides food for humanity. As an industry, it also occupies the largest land area of any on the planet. To achieve food security while keeping the planet healthy, crop production from the existing land base must be increased in a sustainable way. Tools now exist to understand crop production and to manage it precisely. Satellites can provide near real-time imagery of fields that can be used to monitor crop growth. Farm machinery now routinely steers itself and the levels of inputs can be changed within a field to precisely deliver the optimal rate to the crop. This variable rate technology has resulted in both economic and environmental benefits as more crops receive the optimum level of inputs, thereby increasing crop yields while avoiding excess nutrients, which can result in environmental pollution. These technological advances have resulted in a Precision Agriculture industry with some of the world's leading companies based in western Canada including CropPro, Nutrien/Echelon and Farmers Edge. This industry already employs University of Saskatchewan graduates from Agriculture, Computer Science and Engineering to meet the demand. In addition to the industrial activity in this area, the University of Saskatchewan has become a centre for precision agriculture research.

This course will be the capstone course for the proposed Precision Agriculture Certificate being developed at the University of Saskatchewan. It will serve as an integrator course where students utilize variable rate technology applied to specific real-world scenarios. It will be open to students from colleges participating in the Precision Agriculture Certificate. It will build upon skills learnt by the students within their respective sub-discipline and the two required courses for the Precision Agriculture Certificate. There will be an emphasis on learning practical, generic methods of analyzing real-world data to develop solutions to precision agriculture. The in-depth knowledge of precision agriculture will allow students to critically evaluate and understand recommendations from commercial precision agriculture companies.

All of society has now entered the information age in which access to and utilization of information and data will drive industry. Within the crop production segment of agriculture, the precision agriculture industry is currently the big-data utilizer. Precision agriculture uses data from a multitude of sources including satellites, UAVs, statistical records, environmental records weather stations and other sensors. Within this class, students will learn how to process and utilize this data within cloud computing platforms to make agronomic decisions. Students will also become familiar with the most up-to-date analytic methods for big-data in crop production including machine learning and neural networks. This exposure and utilization of information will prepare the students for the present and future of digital agriculture.

4. **Please list the learning objectives for this course:**
    1. **Quantify and analyze spatial and temporal variability in crop productivity and nutrient supply using satellite imagery and data**
    2. **Quantify and analyze spatial and temporal variability in soil and landscape and hydrological properties within a geographic information system**
    3. **Utilize and interpret data from crop and soil sensors**
    4. **Utilize methods to develop management zones for variable rate crop input application**
    5. **Be able to evaluate precision agriculture programs**
    6. **Develop communication skills for working in diverse teams**

7. **Solve real world precision agriculture problems using multiple data sources**

5. **Impact of this course**

Are the programs of other departments or Colleges affected by this course? ***Yes***

If so, were these departments consulted? (Include correspondence) **The Precision Agriculture Certificate and required courses were discussed and planned by the Precision Agriculture Certificate committee consisting of representatives of all departments expected to be impacted by this certificate including Plant Sciences, Soil Science, Agricultural and Resource Economics, Computer Science, Geography, and Mechanical Engineering. These representatives discussed the planning of the certificate and these classes with their respective departments.**

Were any other departments asked to review or comment on the proposal? ***No***

6. **Other courses or program affected** (please list course titles as well as numbers)

6.1 Courses to be deleted? ***None***

6.2 Courses for which this course will be a prerequisite? ***None***

6.3 Is this course to be required by your majors, or by majors in another program? ***This course is a required course for the proposed Precision Agriculture Certificate***

7. **Course outline**

(Weekly outline of lectures or include a draft of the course information sheet.)

Week Number & Title	Content Topics
1. Expectations of Course and Introduction to Material	▪ Introduction ▪ Rational for Precision Agriculture ▪ Variable Rate Technology ▪ Introduce Course Project ▪ Lab: Introduction to using GIS for Precision Ag Project
2. Quantification of Spatial Variability	▪ Spatial Statistics ▪ Crop requirements for growth and yield ▪ Drivers of Spatial Variability ▪ Lab: Introduction Quantifying the Spatial and temporal variability of climate
3. Weather Data and Quantification of Temporal Variability	▪ Prairie Climate ▪ Crop Canopy Sensors ▪ Weather Stations ▪ Cloud based GIS systems Google Earth Engine ▪ Lab: Weather and Environment quantification in Google Earth Engine
4. Soil Classification and Predictive Soil Mapping	▪ Soil Formation Factors ▪ Effect of soil on crop growth ▪ Digitization of soil Spatial ▪ Lab: Utilizing Soil Data (Survey and Predicted)

5. Satellite Imagery	▪ Satellite data for precision agriculture ▪ Multispectral data ▪ Side Aperture Radar ▪ UAV imagery and data ▪ Lab: Utilizing Satellite Imagery
6. Yield and Biomass Data	▪ Variables limiting crop yield ▪ Yield response curves ▪ Crop imagery mapping ▪ Crop biomass estimation ▪ Lab: Utilizing yield and vegetative index maps
7. Soil Variability Measurement and Management	▪ Nutrient dynamics in soil ▪ Methods of Soil Testing ▪ Soil Salinity ▪ Soil Electrical Conductivity ▪ Variable rate fertilization ▪ Lab: Soil Nutrient Mapping Methods
8. Landscape Topography and Understanding Soil Water	▪ Digital Elevation Modelling ▪ Understanding Topographic ▪ Hydrology of Water in Crop Productions ▪ Hydrological principles ▪ Lab: Hydrological Modelling with GIS systems
9. Developing Management Zones for soil nutrients	▪ Soil testing principles ▪ Grid sampling ▪ Economically optimum nutrient modelling ▪ Temporally stable spatial variability ▪ Lab: Developing Prescription Maps for Soil Nutrients
10. Developing Management Zones for other inputs	▪ Weed mapping and precision application ▪ Variable rate fungicide application ▪ Variable crop varieties and types ▪ Variable rate seeding ▪ Land cover use ▪ Lab: Developing Prescription Maps for Pesticides
11. Machine Learning	▪ Principals of Machine Leaning ▪ Random Forest classification ▪ Image analysis ▪ Neural Networks ▪ Lab: Machine Learning for Spatial Classification
12. Economics of Precision Agriculture and On-Farm Experimentation	▪ Calculating return on investment ▪ Valuing environmental benefits ▪ On farm experimentation methods ▪ Lab: Work on Final Project
13. Presenting Term Projects	▪ Presentations of term projects by teams

8. **Enrolment**

8.1 Expected enrollment: ***25***

8.2 From which colleges ***Agriculture and Bioresources; Arts and Science; Engineering***

9. **Student evaluation**
Give approximate weighting assigned to each indicator (assignments, laboratory work, mid-term test, final examination, essays or projects, etc.)

9.1 How should this course be graded?
N – Numeric/Percentage
(Grade options for instructor: grade of 0% to 100%, IP in Progress)

9.2 Is the course exempt from the final examination? ***No***

10. **Required text**
Include a bibliography for the course.

Chapters of the following books will be used for specific lectures. Both are available electronically through the USASK library.

Shannon, D.K., D.E. Clay, and N.R. Kitchen. 2018**. Precision Agriculture Basics**. ASA, CSSA, and SSSA, Madison, WI. (available as an e-book through USask library)
https://library.usask.ca/scripts/remote?URL=https://sundog.usask.ca/record=b5643457~S8

Clay, D. E., Clay, S. A., & Bruggeman, S. (Eds.) (2017). **Practical Mathematics for Precision Farming.** ASA, CSSA, and SSSA, Madison, WI. (available as an e-book through USask library)
https://library.usask.ca/scripts/remote?URL=https://sundog.usask.ca/record=b5643458~S8

11. **Resources**
11.1 Proposed instructor: **Professor Steven Shirtliffe**
11.2 How does the department plan to handle the additional teaching or administrative workload? ***This will be a part of Dr. Shirtliffe's regular course offerings.***
11.3 Are sufficient library or other research resources available for this course?
Yes, the liaison librarian for Agriculture and Bioresources has been contacted and resources are available.
11.4 Are any additional resources required (library, audio-visual, technology, etc.)? ***No***

12. **Tuition**
12.1 Will this course attract tuition charges? If so, how much? (use tuition category) ***Yes, Tuition Category 13***
12.2 Does this course require non-standard fees, such as materials or excursion fees? If so, please include an approved "Application for New Fee or Fee Change Form" http://www.usask.ca/sesd/info-for-instructors/program-course-preparation.php#course-fees. ***N/A***

Detailed Course Information

1. Schedule Types
Please choose the Schedule Types that can be used for sections that fall under this course:

Code	Description
LEC	Lecture

2. Course Attributes
Please highlight the attributes that should be attached to the course (they will apply to all sections):

2.1 NOAC No Academic Credit
0 Credit Unit courses that possess "deemed" CUs (Called Operational Credit Units). NOAC causes the system to roll 0 academic credit units to academic history.

2.2 For the College of Arts and Science only: To which program type does this course belong?

FNAR Fine Arts
HUM Humanities
SCIE Science
SOCS Social Science
ARNP No Program Type (Arts and Science)

Does this course satisfy one of the official college requirements:

ELWR – English Language Writing Requirement
ILRQ – Indigenous Learning Requirement
QRRQ – Quantitative Reasoning Requirement

3. Registration Information (Note: multi-term courses cannot be automated as corequisites)

3.1 Permission Required: N/A
3.2 Restriction(s): course only open to students in a specific college, program/degree, major, year in program N/A
3.3 Prerequisite(s): course(s) that must be completed prior to the start of this course PLSC 202 and GEOG 222
3.4 Prerequisite(s) or Corequisite(s): course(s) that can be completed prior to or taken at the same time as this course N/A
3.5 Corequisite(s): course(s) that must be taken at the same time as this course N/A
3.6 Notes: recommended courses, repeat restrictions/content overlap, other additional information

Recommended courses: **One of PLSC 214.3, STAT 245.3 or GE 210.3 is strongly recommended.**

4. List Equivalent Course(s) here:
An equivalent course can be used in place of the course for which this form is being completed, specifically for the purposes of prerequisite and degree audit checking. Credit will be given for only one of the equivalent courses.

4.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be equivalent: N/A

*__Please note__: If the equivalent courses carry an UNEQUAL number of credit units, DegreeWorks will automatically enforce the following, unless otherwise stated:

- If a 3 credit unit course is considered to be equivalent to a 6 credit unit course, it will fulfill the 6 credit unit requirement and the student will not have to complete another 3 credit units toward the overall number of required credit units for the program.
- If a 6 credit unit course is considered to be equivalent to a 3 credit unit course, ALL 6 of the credit units may be used to fulfill the 3 credit unit requirement.

5. List Mutually-Exclusive Course(s) here:
Mutually exclusive courses have similar content such that students cannot receive credit for both.

5.1 If this is a recently-repurposed course number, please list the courses that are no longer considered to be mutually exclusive: N/A

***Please note:** SiRIUS cannot enforce a situation where the exclusion goes only one way.

6. Additional Notes:

UNIVERSITY OF SASKATCHEWAN

Budget Requirements for New Programs and Major Revisions

This form is to be completed with the assistance of the Financial Analyst that is assigned to your College by the Financial Services Division. The Financial Analyst should be contacted early in the process and will assist you in completing a budget template that is appropriate for your proposal.

This form identifies the relevant financial issues that should be summarized in your proposal and is to be completed for all new programs and major revisions regardless of whether new budgetary resources or budget reallocations are required from outside the sponsoring unit.

In particular, as well as summarizing capital and start-up, and permanent or ongoing resource requirements, this form facilitates a summary of the impact of the proposal on the university's tuition and fee revenue. In addition, all relevant funding sources must be identified, with appropriate letters of support from each funding source.

The information provided herein must be consistent with the financial information required on all other forms that are submitted with the program proposal. In that regard, this form should be finalized after all other required forms are competed and attached to the proposal.

This form is to be completed by the faculty member responsible for the program proposal in consultation with the Financial Services Division. As noted above, contact the Financial Analyst responsible for your College for assistance. (Dial #8303 if you have questions regarding Financial Analyst assignments.)

1. Proposal Identification

Full name of program: Precision Agriculture Certificate

Short form (degree abbreviation):

Sponsoring Dept/College: Agriculture and Bioresources

2. Full costing of resource requirements

The resource requirements summarized in this section are to be consistent with the information required in all other forms attached to the proposal.

a) Capital and Start-up Costs:

Examples of capital and start-up costs include new space, renovations, equipment, computer hardware and software, media and technology, and faculty costs for course development. Specifically, the resource requirements should agree to the Library, Information Technology, and Physical Resource requirement forms. If any of the capital and/or start-up costs also permanent operating cost implications, the permanent resource requirements should be summarized below.

Start up costs are $50,000 representing teaching release for course development. This has been provided through the AgBio Academic Opportunity fund by assignment of an instructor to two courses.

b) Permanent Operating Costs:

Examples of permanent operating costs include costs for faculty, administrative, technical and other support staff, materials and supplies, and media and technology costs. While salary and benefit requirements for faculty and support staff are significant items, the resource requirements noted in the Registrar's, Library and/or Information Technology forms and ongoing operating or maintenance costs noted in the Physical Resources form, must also be summarized in this section.

Additional costs for instruction of new courses, student laboratories and teaching assistants will be incurred as enrolment grows. When the program reaches anticipated 2 year enrolment of 30 students, costs are allocated as follows:

Course instruction	$50,000
Student and laboratory costs	1,228
Teaching assistants	1,450
Total	$52,678

3. Sources of funding

For the total amount of resources required for both capital and start-up costs, and for permanent operating costs, identify the amount required from each funding source and provide documentation from the funding source to support the amount.

The sources of funding could include the sponsoring college/departments base operating budget, other college/department sources of internal funding, special internal funding allocations such as priority determination, central university funds, and external sources as appropriate. Where the source of funding includes one or more colleges/departments, each individual college/department should be reported separately.

Funding for the incremental costs will be generated through the operating envelope with additional tuition generated and unrestricted operating grant allocations for instruction and credentials.

4. Enrolment (tuition revenue)

The enrolment data summarized in this section is to be consistent with the information required in the New Courses form. Where enrolment growth is projected, the amount and the related time period should be identified and explained.

The enrolment data should be provided in a manner that can be easily used to calculate tuition revenue. For example, enrolment data for degree courses should be presented as either 3-cu or 6-cu equivalents. The information presented should clearly differentiate between actual enrolment levels before the change and expected enrolment levels following the change, including growth as noted above.

a) Sponsoring college/department

The enrolment increases and decreases in courses in the sponsoring college/department must be provided in sufficient detail for a tuition revenue calculation. If enrolment levels are expected to increase significantly, documentation supporting the increase must be provided.

	Year 1	Year 2
Total Headcount	15.00	30.00
AgBio 3 cue	40.50	68.25
Incremental AgBio 3 cue	13.50	22.75

Note that the enrolment indicated here is related only to students enrolled in the Precision Agriculture Certificate. The courses are open to other students, and it is expected some students who are not in the program will enroll in PLSC 202 and PLSC 402. In addition, the incremental students (10) will be enrolled in a BSA or BSc program and will be contributing an additional $60,000 per year related to the remaining credit unit requirements for completion of the degree.

b) Other college/department:
The enrolment increases and decreases in courses in the other colleges/departments must be provided in sufficient detail for a tuition revenue calculation. If enrolment levels are expected to increase significantly, documentation supporting the increase must be provided.

If enrolments will increase or decrease in other colleges/departments, the change in resources requirements, if any, resulting from the increase or decrease should be included in section 2.

Partnering colleges will have increment 3 cue activity as a result of the core course (GEOG 222) and restricted elective options.

	Year 1	Year 2
Arts & Science 3 cue	3.00	19.50
Incremental Arts & Science 3 cue	1.00	6.50
Engineering	1.50	2.25
Incremental Engineering 3 cue	0.50	0.75

5. Additional Comments
Please provide and additional comments to support the program budget.

Date: February 18, 2022

Financial Analyst (assisting in form preparation
on behalf of the Financial Services Division): Laurel Sawatzki

Faculty member (for the sponsoring college/dept):

UNIVERSITY OF SASKATCHEWAN

Budgetary and Financial Implications (Master Worksheet) - New or Existing Program Proposal

Requirements: To be completed for proposals of new academic programs or revisions to existing academic programs (including termination).
Ensure this completed form is reviewed with Institutional Planning & Assessment prior to inclusion in the Notice of Intent submission.

Instructions:
1a. Identify start-up costs in the Start-Up Costs worksheet, which will auto-calculate in the Master worksheet per below.
1b. Identify limited term and ongoing revenue and expenditure estimates directly in the Master worksheet per below.
2. Areas shaded in grey denote required inputs. All other cells are auto-calculated.
3. For programs expected to generate a deficit in any given year, provide an explanation of how that deficit will be managed in future year(s) in order to ensure long-term financial sustainability.

Name of Program: **Precision Agriculture Certificate**

	Academic Year					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Comments**
Revenue						
Tuition revenue:						
Total # of domestic students (headcount)	15	30	30	30	30	
Domestic tuition rate	$ 693.90	$ 1,045.50	$ 1,045.50	$ 1,045.50	$ 1,045.50	only included 3 core courses, averaged over 2 years starting in Year 2
Total tuition revenue - domestic	$ 10,408.50	$ 31,365.00	$ 31,365.00	$ 31,365.00	$ 31,365.00	
						Students also take 9 cue of electives which are not included here ($31,413 per year)
Total # of international students (headcount)						
International tuition rate						
Total tuition revenue - international	$ -	$ -	$ -	$ -	$ -	
Student fees*						
Excursion						
Lab						
Other *(list in Comments)*						
Total student fees	$ -	$ -	$ -	$ -	$ -	
External funding sources *(list in Comments)*						
Internal funding sources *(list in Comments)*	$ 25,000.00					Course development is teaching release funded by AgBio Academic Opportunity. One course was developed in 2021/22.
Total Revenue	**$ 35,408.50**	**$ 31,365.00**	**$ 31,365.00**	**$ 31,365.00**	**$ 31,365.00**	
Expenditures						assume escalation in costs is covered by escalation in tuition, therefore no adjustement is included in either section
Start-up costs	$ 25,000.00	n/a	n/a	n/a	n/a	
Salary and benefits:						
Faculty	$ 25,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	$ 50,000.00	AgBio standard for faculty instruction, 2 new courses are related to the program. No incremental cost for GEOG as sufficient capacity in existing course exists.
Sessionals or limited term instructional support						
Students	$ 861.00	$ 1,450.00	$ 1,450.00	$ 1,450.00	$ 1,450.00	
Staff						

Honoraria						
Total salary and benefits	$ 25,861.00	$ 51,450.00	$ 51,450.00	$ 51,450.00	$ 51,450.00	
Scholarships and bursaries						
Marketing and promotion						
Materials and supplies	$ 659.00	$ 1,228.00	$ 1,228.00	$ 1,228.00	$ 1,228.00	
Travel						
Equipment and IT						
Other costs *(list in Comments)*						
Total Expenditures	**$ 51,520.00**	**$ 52,678.00**	**$ 52,678.00**	**$ 52,678.00**	**$ 52,678.00**	
Estimated Surplus or Deficit	**$ (16,111.50)**	**$ (21,313.00)**	**$ (21,313.00)**	**$ (21,313.00)**	**$ (21,313.00)**	

**Relates to fees revenue specific to the course or program (e.g. excursion, lab, materials, etc). Excludes compulsory institutional fees (e.g. Athletic, Recreation, etc.).*

Notes: Approximately 2/3 of the cost of offering two new courses is covered through tuition from certificate students alone. As with overall university operations, the unrestricted provincial operating grant typically supports delivery of academic programs. This estimate does not include tuition from students outside of the certificate who may also take the two PLSC courses as electives, nor does it include tuition that students in the certificate may generate by taking courses and electives to complete a larger diploma or degree. We estimate that 10 students are new to the univeristy as a result of the certificate, which translates into an additional $60,000 per year in tuition related to completion of the remaining 102 credit units to complete their degree.

For questions about this form, including review prior to submission to PPC, contact Lucy Vuong (Programs and Planning Officer, IPA) at lucy.vuong@usask.ca.

UNIVERSITY OF SASKATCHEWAN

Planning & Priorities Committee of Council
Budgetary and Financial Implications (Start-Up Costs) - New or Existing Program Proposal

Requirements: Itemize start-up costs for proposals of new academic programs or revisions to existing academic programs (including termination).
Ensure this completed form is reviewed with Institutional Planning & Assessment prior to inclusion in the Notice of Intent submission to the Planning & Priorities Committee of Council.

Instructions:
1. Areas shaded in grey denote required inputs. This will auto-calculate in the Master worksheet.

Name of Program: **Precision Agriculture Certificate**

	Academic Year	
	Year 1	**Comments**
Start-Up Costs		
Faculty and staff recruitment	$ -	
Marketing and promotion	$ -	
Curriculum development	$ 50,000.00	teaching release for 2 courses to allow for course development. One course is developed prior to program launch and one in year 1.
Facilities refurbishment	$ -	
Equipment and IT	$ -	
Library enhancements	$ -	
Other *(list in Comments)*	$ -	
Total Start-Up Costs	**$ 50,000.00**	

Notes: curriculum development cost covered through AgBio Academic Opportunity Fund. The total on this start up page is higher than the Master for due to timing of development and program launch.

For questions about this form, including review prior to submission to PPC, contact Lucy Vuong (Programs and Planning Officer, IPA) at lucy.vuong@usask.ca.

UNIVERSITY OF SASKATCHEWAN

Planning & Priorities Committee of Council
Budgetary and Financial Implications (Supplementary Information) - New or Existing Program Proposal

Requirements: Provide detailed information to support the financial information noted in the worksheets.
Ensure this completed form is reviewed with Institutional Planning & Assessment prior to inclusion in the Notice of Intent submission to the Planning & Priorities Committee of Council.

Name of Program: **Precision Agriculture Certificate**

Enrolment: What is the anticipated target market of the students being recruited for this program (e.g. geographic location, from other programs, etc.)? Do you foresee any barriers to recruitment in the coming year? If enrolment targets are not met, explain whether or not the program will continue to be offered. If so, what modifications would be required to accommodate the lower than expected enrolment?
The precision agriculture skills are a recognized need in the current environment and the content needs to be incorporated in the agriculture program. The certificate is a way to have formal recognition of the student's competence in this area. Students who are not registered in the certificate are allowed to enroll in the two new courses, but that potential tuition is not captured in the Master sheet. The certificate enrolment is expected to be an intake of 15 student per year, with a target full program enrolment of 30 students. Course enrolment will be monitored, and if sufficient demand from students outside of the certificate exists, the courses could be maintained even if the Certificate does not achieve its enrolment target.

Faculty and staff: List the number of FTE for each employment category (USFA, ASPA, CUPE, etc.) to support this program. This should include new and existing faculty and staff resources.
Year 1: .125 faculty FTE (instructional time for one course)
Year 2: .375 faculty FTE (instructional time for three courses)
Year 3:.375 faculty FTE (instructional time for three courses)
Year 4:.375 faculty FTE (instructional time for three courses)
Year 5:.375 faculty FTE (instructional time for three courses)

Indirect costs: Identify resources required from other units (central, other colleges/depts) to effectively deliver the program (e.g. for online delivery, will there be a requirement for DEU and ICT support?).

Existing central resources are sufficient for in person program delivery.

Financial management: Identify strategies to support the delivery of this program if there is a shortfall in revenue or excess in expenditures as noted in the Master worksheet.

In and of itself, the certificate is not likely to generate sufficient tuition to cover instructional costs. This is consistent with the university's reliance on the provincial operating grant to keep tuition at a reasonable level. Students cannot take the certificate as a stand alone credential, but may add it to their existing degree, or it will attract and retain students to the BSA who might have gone to another institution. We estimate 10 students will be new to the university degree programs, and would contribute approximately $60,000 per year in tuition for completion of the degree requirements.

For questions about this form, including review prior to submission to PPC, contact Lucy Vuong (Programs and Planning Officer, IPA) at lucy.vuong@usask.ca.

Consultation with the Registrar Form

This form is to be completed by the Registrar (or his/her designate) during an in-person consultation with the faculty member responsible for the proposal. Please consider the questions on this form prior to the meeting.

Section 1: New Degree / Diploma / Certificate Information or Renaming of Existing

1 Is this a new degree, diploma, or certificate? Yes [X] No [ ]

Is an existing degree, diploma, or certificate being renamed? Yes [X] No [ ]

If you've answered NO to each of the previous two questions, please continue on to the next section.

2 What is the name of the new degree, diploma, or certificate?

Certificate in Precision Agriculture (CPAG - Cert in Precision Agriculture - suggested Banner code and description)

3 What is the credential of this new degree, diploma, or certificate? [Example - D.M.D. = Doctor of Dental Medicine]

Cert.

4 If you have renamed an existing degree, diploma, or certificate, what is the current name?

N/A

5 Does this new or renamed degree / diploma / certificate require completion of degree level courses or non-degree level courses, thus implying the attainment of either a degree level or non-degree level standard of achievement?

Degree level

6 If this is a new degree level certificate, can a student take it at the same time as pursuing another degree level program? Yes [X] No [ ]

7 If YES, a student attribute will be created and used to track students who are in this certificate alongside another program. The attribute code will be:

CPAG - In Cert Precision Agriculture

8 Which College is responsible for the awarding of this degree, diploma, or certificate?

College of Agriculture and Bioresources (AB)

9 Is there more than one program to fulfill the requirements for this degree, diploma, or certificate? If yes, please list these programs.

N/A

10 Are there any new majors, minors, or concentrations associated with this new degree / diploma / certificate? Please list the name(s) and whether it is a major, minor, or concentration, along with the sponsoring department.

0000 (Undeclared) / Department of Plant Sciences [PLSC]

11 If this is a new graduate degree, is it thesis-based, course-based, or project-based?

N/A

Section 2: New / Revised Program for Existing or New Degree / Diploma / Certificate Information

1 Is this a new program? Yes [X] No [ ]

Is an existing program being revised? Yes [ ] No [X]

If you've answered NO to each of the previous two questions, please continue on to the next section.

2 If YES, what degree, diploma, or certificate does this new/revised program meet requirements for?

Certificate in Precision Agriculture (CPAG - Cert in Precision Agriculture - suggested Banner code and description)

3 What is the name of this new/revised program?

Certificate in Precision Agriculture (CPAG - Cert in Precision Agriculture - suggested Banner code and description)

4 What other program(s) currently exist that will also meet the requirements for this same degree(s)?

N/A

5 What College/Department is the academic authority for this program?

College of Agriculture and Bioresources (AB) / Department of Plant Sciences (PLSC)

6 Is this a replacement for a current program? Yes [ ] No [X]

7 If YES, will students in the current program complete that program or be grandfathered?

8 If this is a new graduate program, is it thesis-based, course-based, or project-based?

N/A

9 If this is a new non-degree or undergraduate level program, what is the expected completion time?

21 credit units - which can be completed over the course of a student's 2nd, 3rd, and 4th years (not a direct-entry program and must be enrolled in a degree program)

Section 3: Mobility

Mobility is the ability to move freely from one jurisdiction to another and to gain entry into an academic institution or to participate in a learning experience without undue obstacles or hindrances.

1 Does the proposed degree, program, major, minor, concentration, or course involve mobility? Yes [ ] No [X]

If yes, choose one of the following?

- Domestic Mobility (both jurisdictions are within Canada) [ ]
- International Mobility (one jurisdiction is outside of Canada) [ ]

2 Please indicate the mobility type (refer to Nomenclature for definitions).

- Joint Program [ ]
- Joint Degree [ ]
- Dual Degree [ ]
- Professional Internship Program [ ]
- Faculty-Led Course Abroad [ ]
- Term Abroad Program [ ]

3 The U of S enters into partnerships or agreements with external partners for the above mobility types in order to allow students collaborative opportunities for research, studies, or activities. Has an agreement been signed? Yes [ ] No [ ]

4 Please state the full name of the agreement that the U of S is entering into.

5 What is the name of the external partner?

6 What is the jurisdiction for the external partner?

Section 4: New / Revised Major, Minor, or Concentration for Existing Degree Information (Undergraduate)

1 Is this a new or revised major, minor, or concentration attached to an existing degree program? Yes [ ] No [X] Revised [ ]
If you've answered NO, please continue on to the next section.

2 If YES, please specify whether it is a major, minor, or concentration. If it is more than one, please fill out a separate form for each.

3 What is the name of this new / revised major, minor, or concentration?

4 Which department is the authority for this major, minor, or concentration? If this is a cross-College relationship, please state the Jurisdictional College and the Adopting College.

5 Which current program(s), degree(s), and/or program type(s) is this new / revised major, minor, or concentration attached to?

Section 5: New / Revised Disciplinary Area for Existing Degree Information (Graduate)

1 Is this a new or revised disciplinary area attached to an existing graduate degree program? Yes [ ] No [X] Revised [ ]
If you've answered NO, please continue on to the next section.

2 If YES, what is the name of this new / revised disciplinary area?

3 Which Department / School is the authority for this new / revised disciplinary area? (NOTE - if this disciplinary area is being offered by multiple departments see question below.)

4 Which **multiple** Departments / Schools are the authority for this new / revised disciplinary area?

4a Of the **multiple** Departments / Schools who are the authority for this new / revised disciplinary area and what allocation percentage is assigned to each? (Note - must be whole numbers and must equal 100.)

4b Of the **multiple** Departments / Schools who is the primary department? The primary department specifies which department / school policies will be followed in academic matters (ex. late adds, re-read policies, or academic misconduct). If no department / school is considered the primary, please indicate that. (In normal circumstances, a department / school with a greater percentage of responsibility - see question above - will be designated the primary department.)

5 Which current program(s) and / or degree(s) is this new / revised disciplinary area attached to?

Section 6: New College / School / Center / Department or Renaming of Existing

1	Is this a new college, school, center, or department?	Yes		No	X
	Is an existing college, school, center, or department being renamed?	Yes		No	X
	Is an existing college, school, center, or department being deleted?	Yes		No	X

If you've answered NO to each of the previous two questions, please continue on to the next section.

2 What is the name of the new (or renamed or deleted) college, school, center, or department?

3 If you have renamed an existing college, school, center, or department, what is the current name?

4 What is the effective term of this new (renamed or deleted) college, school, center, or department?

5 Will any programs be created, changed, or moved to a new authority, removed, relabelled?

6 Will any courses be created, changed, or moved to a new authority, removed, relabelled?

7 Are there any ceremonial consequences for Convocation (ie. New degree hood, adjustment to parchments, etc.)?

Section 7: Course Information

1 Is there a new subject area(s) of course offering proposed for this new degree? If so, what is the subject area(s) and the suggested four (4) character abbreviation(s) to be used in course listings?

No

2

If there is a new subject area(s) of offerings what College / Department is the academic authority for this new subject area?

3 Have the subject area identifier and course number(s) for new and revised courses been cleared by the Registrar?

4 Does the program timetable use standard class time slots, terms, and sessions? Yes No

If NO, please describe.

5 Does this program, due to pedagogical reasons, require any special space or type or rooms? Yes No

If YES, please describe.

NOTE: Please remember to submit a new "Course Creation Form" for every new course required for this new program / major. Attached completed "Course Creation Forms" to this document would be helpful.

Section 8: Admissions, Recruitment, and Quota Information

1 Will students apply on-line? If not, how will they apply?

Yes

2 What term(s) can students be admitted to?

YYYY09 [September] and YYYY01 [January]

3 What is the application deadline for each term(s) students can be admitted to?

August 15 for YYYY09 term and December 1 for YYYY01 term

4 For undergraduate programs, will students be admitted to one of the approved majors or an undeclared major?

N/A

5 For undergraduate programs, if there's more than one degree proposed (ex. 3Y and 4Y), which program/degree will students be admitted to?

N/A

6 Does this impact enrollment?

Expect slight increase

7 How should Marketing and Student Recruitment handle initial inquiries about this proposal before official approval?

Refer to the College of Agriculture and Bioresources

8 Can classes towards this program be taken at the same time as another program?

Yes

9 What is the application deadline?

As per current set-up

10 What are the admission qualifications? (IE. High school transcript required, grade 12 standing, minimum average, any required courses, etc.)

Regular Admission
- completion of at least 24 cu's of post-secondary coursework
- minimum average of 70% on 18 or more transferable cu's or the cumulative weighted average from a recognized and/or accredited post-secondary institution; average calculated on all attempted courses (without breaking up an academic session) which are transferable to USask
- proficiency in English

11 What is the selection criteria? (IE. If only average then 100% weighting; if other factors such as interview, essay, etc. what is the weighting of each of these in the admission decision.)

Regular Admission
- academic average - 100% weighting (average is calculated on 18 or more transferable cu's)

12 What are the admission categories and admit types? (IE. High school students and transfer students or one group? Special admission? Aboriginal equity program?)

Regular Admission
- admission is based on the successful completion of at least 18 cu's of transferable university-level coursework at a recognized and/or accredited post-secondary institution, with an average of at least 70%

13 What is the application process? (IE. Online application and supplemental information (required checklist items) through the Admissions Office or sent to the College/Department?)

Admissions Office

14 Who makes the admission decision? (IE. Admissions Office or College/Department/Other?)

Admissions Office

15 Letter of acceptance - are there any special requirements for communication to newly admitted students?

Admissions Office

16 Will the standard application fee apply?

Because students must have first been admitted into a degree program, will not be a separate application fee

17 Will all applicants be charged the fee or will current, active students be exempt?

Current, active students are exempt

18 Are international students admissible to this program? If YES, see Section 18 for Tuition and Fees information. Yes [X] No [ ]

Section 9: Government Loan Information

NOTE: Federal / provincial government loan programs require students to be full-time in order to be eligible for funding. The University of Saskatchewan defines full-time as enrollment in a minimum of 9 credit units (operational) in the fall and/or winter term(s) depending on the length of the loan.

1 If this is a change to an existing program, will the program change have any impact on student loan eligibility?

N/A

2 If this is a new program, do you intend that students be eligible for student loans?

Yes

Section 10: Convocation Information (only for new degrees)

1 Are there any 'ceremonial consequences' of this proposal (ie. New degree hood, special convocation, etc.)?

Yes - new credential

2 If YES, has the Office of the University Secretary been notified?

Yes,the College has contacted Amanda Storey

3 When is the first class expected to graduate?

June 2024 (Spring Convocation 2024)

4 What is the maximum number of students you anticipate/project will graduate per year (please consider the next 5-10 years)?

Aiming for a total of approximately 30 students enrolled with 15 students graduating annually

Section 11: Schedule of Implementation Information

1 What is the start term?

202309 (September 2023)

2 Are students required to do anything prior to the above date (in addition to applying for admission)? Yes [ ] No [X]

If YES, what and by what date?

Section 12: Registration Information

1 What year in program is appropriate for this program (NA or a numeric year)?
(General rule = NA for programs and categories of students not working toward a degree level qualification; undergraduate degree level certificates will use numeric year.)

Numeric year

2 Will students register themselves? Yes [X] No [ ]
If YES, what priority group should they be in?

As per current set-up

Section 13: Academic History Information

1 Will instructors submit grades through self-serve? Yes [X] No [ ]
2 Who will approve grades (Department Head, Assistant Dean, etc.)?

As per current set-up

Section 14: T2202 Information (tax form)

1 Should classes count towards T2202s? Yes [X] No [ ]

Section 15: Awards Information

1 Will terms of reference for existing awards need to be amended? Yes [ ] No [X]
2 If this is a new undergraduate program, will students in this program be eligible for College-specific awards?

Yes

Section 16: Government of Saskatchewan Graduate Retention (Tax) Program

1 Will this program qualify for the Government of Saskatchewan graduate retention (tax) program? Yes [X] No [ ]
To qualify the program must meet the following requirements:
- be equivalent to at least 6 months of full-time study, and
- result in a certificate, diploma, or undergraduate degree.

Section 17: Program Termination

1 Is this a program termination? Yes [ ] No [X]

If yes, what is the name of the program?

2 What is the effective date of this termination?

3 Will there be any courses closed as a result of this termination? Yes [ ] No [ ]

If yes, what courses?

4 Are there currently any students enrolled in the program? Yes [ ] No [ ]

If yes, will they be able to complete the program?

5 If not, what alternate arrangements are being made for these students?

6 When do you expect the last student to complete this program?

7 Is there mobility associated with this program termination? Yes [ ] No [ ]

If yes, please select one of the following mobility activity types.

- [ ] Dual Degree Program
- [ ] Joint Degree Program
- [ ] Internship Abroad Program
- [ ] Term Abroad Program
- [ ] Taught Abroad Course
- [ ] Student Exchange Program

Partnership agreements, coordinated by the International Office, are signed for these types of mobility activities. Has the International Office been informed of this program termination? Yes [ ] No [ ]

Section 18: Proposed Tuition and Student Fees Information

1 How will tuition be assessed?

Standard Undergraduate per credit	X
Standard Graduate per credit	
Standard Graduate per term	
Non standard per credit*	
Non standard per term*	
Other *	
Program Based*	

* See attached documents for further details

2 If fees are per credit, do they conform to existing categories for per credit tuition? If YES, what category or rate?

3 If program based tuition, how will it be assessed? By credit unit? By term? Elsehow?

4 Does proponent's proposal contain detailed information regarding requested tuition? Yes No

If NO, please describe.

5 What is IPA's recommendation regarding tuition assessment? When is it expected to receive approval?

6 IPA Additional comments?

7 Will students outside the program be allowed to take the classes?

8 If YES, what should they be assessed? (This is especially important for program based.)

9 Do standard student fee assessment criteria apply (full-time, part-time, on-campus versus off-campus)?

10 Do standard cancellation fee rules apply?

11 Are there any additional fees (e.g. materials, excursion)? If yes, see NOTE below.

12 Are you moving from one tuition code (TC) to another tuition code? Yes No

If YES, from which tuition code to which tuition code?

13 If international students are admissible to the program, will they pay the international tuition differential? If YES, explain the amount. Yes No

14

If YES, what is the tuition amount for the first 12 months for a full-time international student? This information is required for the Immigration, Refugees and Citizenship Canada [IRCC] form (this form is for students who need to get a visa to study here).

NOTE: Please remember to submit a completed "Application for New Fee or Fee Change Form" for every new course with additional fees.

Section 19: TLSE - Information Dissemination (internal for TLSE use only)

1	Has TLSE, Marketing and Student Recruitment, been informed about this new / revised program?	Yes		No
2	Has TLSE, Admissions, been informed about this new / revised program?	Yes		No
3	Has TLSE, Student Finance and Awards, been informed about this new / revised program?	Yes		No
4	Has CGPS been informed about this new / revised program?	Yes		No
5	Has TLSE, Transfer Credit, been informed about any new / revised courses?	Yes		No
6	Has ICT-Data Services been informed about this new or revised degree / program / major / minor / concentration?	Yes		No
7	Has the Library been informed about this new / revised program?	Yes		No
8	Has ISA been informed of the CIP code for new degree / program / major?	Yes		No
9	Has Room Scheduling/Scheduling Hub/Senior Coordinator of Scheduling been informed of unique space requirements for the new courses and/or informed of program, course, college, and department changes?	Yes		No
10	Has the Convocation Coordinator been notified of a new degree?	Yes		No

11 What is the highest level of financial approval required for this submission? Check all that apply.

a. None - as it has no financial implications

OR

b. Fee Review Committee

c. Institutional Planning and Assessment (IPA)

d. Provost's Committee on Integrated Planning (PCIP)

e. Board of Governors

f. Other

SIGNED

Date:

Registrar (Russell Isinger):

College Representative(s):

IPA Representative(s):