



University of Puerto Rico
Mayagüez Campus
College of Agricultural Sciences
Department of Agricultural and Biosystems Engineering
Agricultural and Environmental Systems



OFFICIAL SYLLABUS

1. General Information:

Alpha-numeric codification: SAGA 5030
Course Title: Precision Agriculture Technologies
Number of Credits:
Contact Period: 2 hours conference and a 3 hours laboratory per week.

2. Course Description:

English: Analysis of the foundations of precision technologies in modern agriculture including global positioning system (GPS) receivers, geographical information systems (GIS) software, automatic tractor guidance systems, variable rate technologies, and sensing technologies.

Spanish: Análisis de los fundamentos del uso de tecnologías de precisión en la agricultura moderna, incluyendo receptores de sistemas de posicionamiento global (GPS), software de sistemas de información geográfica (SIG), sistemas de guía de tractores autónomos, tecnologías de índice variable y tecnologías de detección con sensores.

3. Prerequisites/Corequisites:

Prerequisites: TMAG 4015 or SAGA 4015 or Authorization of the Director of the Department
Corequisites:

4. Course Objectives:

At the end of the course the students will be able to:

- explain the concepts of precision agriculture technologies.
- use the discussed precision agricultural technology to improve efficiency.
- analyze sensor data and make recommendations.

5. Instructional Strategies:

- conference discussion computation laboratory
 seminar with formal presentation seminar without formal presentation workshop
 art workshop practice trip thesis special problems
 tutoring research others, please specify:

6. Minimum or Required Resources Available:

Following resources and facilities will be required, and they are available, or can be requested.

- Classroom with a projector
- Computer room with GIS software
- Course website hosted by Moodle Institucional

7. Course time frame and thematic outline:

Conference Outline		Contact Hours
a.	Introduction to precision agriculture	2
b.	Satellite based positioning systems	5
c.	Geographic information systems	4
d.	Remote sensing	4
e.	Soil sampling and analysis	5
f.	Variable rate technologies	5
g.	Yield monitoring and mapping	5
Total hours:		30

Laboratory Outline		Contact Hours
a.	Introduction and unit conversions	3
b.	Comparison of accuracies of GPS receivers and mapping a field boundary	3
c.	Hands on practice with a GIS software Part I	3
d.	Hands on practice with a GIS software Part II	3
e.	Crop sensing	3
f.	Calculation of vegetation indices such as Normalized Difference Vegetative Index (NDVI)	3
g.	Soil properties mapping	3
h.	Calibration of variable rate sprayer	3
i.	Calibration of a yield sensor and generation of yield maps	3
j.	Preliminary round of technical presentations	3
k.	Field trips	9
l.	Final round of technical presentations	6
Total hours:		45

8. Grading System:

Quantifiable (letters) Not Quantifiable

Standard curve: 90 to 100 A; 80 < 90 B; 70 < 80 C; 60 < 70 D; < 60 F

9. Evaluation Strategies:

	Quantity	Percent
<input checked="" type="checkbox"/> Exams	2 @ 25%	50
<input checked="" type="checkbox"/> Final Exam		20
<input type="checkbox"/> Short Quizzes		
<input checked="" type="checkbox"/> Homework		10
<input checked="" type="checkbox"/> Laboratory		15
<input checked="" type="checkbox"/> Oral Reports		5
<input type="checkbox"/> Written Reports		
<input type="checkbox"/> Journals		
<input type="checkbox"/> Other, specify:		
TOTAL:		100%

10. Bibliography

Daniel Ess, and Mark Morgan. *The Precision Farming Guide for Agriculturists*. Third Edition. John Deere Publishing. Illinois. (2010). ISBN 0-86691-358-0.

Heege, Hermann. *Precision in Crop Farming: Site Specific Concepts and Sensing Methods: Applications and Results*. (2013). Springer. New York. ISBN-13: 978-940076759.

National Academy of Sciences. *Precision Agriculture in the 21st Century: Geospatial and Information Technologies in Crop Management*. National Academy Press. Washington DC. (1997). ISBN: 978-0-309-05893-3. Latest edition.

Zhang Qin (Editor). *A. Precision Agriculture Technology for Crop Farming*. CRC Press and Taylor and Francis Group. Florida. (2016). ISBN-13: 978-1482251074.

11. According to Law 51:

Law 51: The Comprehensive Educational Services Act for People with disabilities states that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

12. Academic Integrity:

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.—

13. Policy Against Discrimination Based on Sex, Sexual Orientation, and Gender Identity:

The University of Puerto Rico prohibits discrimination based on sex, sexual orientation, and gender identity in any of its forms, including that of sexual harassment. According to the Institutional Policy Against Sexual Harassment at the University of Puerto Rico, Certification Num. 130, 2014-2015 from the Board of Governors, any student subjected to acts constituting sexual harassment, may turn to the Office of the Student Ombudsperson, the Office of the Dean of Students, and/or the Coordinator of the Office of Compliance with Title IX for an orientation and/or formal complaint.

14. Sexual Harassment: Certification 130-2014-2015 states:

Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

15. Certification 06-43 of the Academic Senate states, "The academic guidelines for offering online courses," defines:

Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 16-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.