



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



OFFICIAL SYLLABUS

**AGRICULTURAL MACHINERY II
SAGA 4025**

Credit Hours: 3	Contact Hours: Two (2) hours conference and a laboratory period of three (3) hours per week.
Prerequisites: (TMAG 4009 o SAGA 4009) y (TMAG 4015 o SAGA 4015)	Co-requisites: None
Course Description (English): Advanced study of agricultural machinery, including machinery for application of chemical products, harvesting, and others.	
Course Description (Spanish): Estudio avanzado de la maquinaria agrícola, incluyendo maquinaria para la aplicación de productos químicos, cosechadoras y otros.	
Learning Objectives: At the end of the course the students will be able to: a. understand working of an internal combustion engine, electric motor and material handling machinery, and b. understand and evaluate the technologies required for practicing precision agriculture.	

Content Outline and Time Distribution:

<i>Topics to be covered</i>		<i>Contact hours</i>
I.	Introduction	1
II.	Concept of work, power and torque	1
III.	Internal combustion engines	4
IV.	Electric motors	1
V.	Material handling	2
VI.	Equipment size selection	2
VII.	Precision agriculture	4
VIII.	Sensors: Machine vision, on-the-go soil sensors, precision livestock (gait, breathing, identification, tracking)	2
IX.	GPS: Functionality and operation of available systems (GPS, GLONASS), error correction (e.g. RTK), automatic steering	2
X.	Communication systems: Controller Area Network (CAN), ISO11783 (ISOBUS).	1
XI.	Technologies for precision seeding	2
XII.	Variable rate technologies for chemical application	2
XIII.	Yield monitors and yield map generation	2
XIV.	Remote sensing and drone applications in agriculture	2
XV.	Robotics and automation in agriculture	2
XVI.		
XVII.		
XVIII.		
<i>Total hours: (equivalent to course contact period)</i>		30

<i>Laboratories</i>		<i>Contact hours</i>
1.	Concept of work, power and torque	3
2.	Internal combustion engines	3
3.	Electric motors	3
4.	Equipment size selection	3
5.	Material handling equipment	3
6.	Mid-term exam I	3
7.	GPS use in agricultural machinery	3
8.	Calculation of NDVI (Normalized Difference Vegetative Index)	3
9.	Generation of yield maps	3
10.	Mid-term exam II	3
11.	First round of technical presentations and feedback	3
12.	Field trip	3
13.	Field trip	3
14.	Final round of technical presentations	3
15.	Review for Final exam	3
<i>Total hours: (equivalent to laboratory contact period)</i>		45

Instructional Techniques:

- 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:

Learning Resources and Minimum Facilities Available or Required:

The course will take place in a traditional classroom. I will be using a computer projector during the presentation of the theory. Laboratory exercises will be carried out in the facilities of the Department of Biosystems and Agricultural Engineering, on grounds the Coliseo Rafael and the Finca Alzamora. Heavy equipment that is not available in the lab will be covered through the scheduled field trips during the semester. There will be some laboratory sessions where only calculations of performance and calibration will be discussed.

The student must have access to the Internet to access the ECOURSES UPRM (<https://ecourses.uprm.edu/>) account. Biosystems and agricultural engineering department computers can be used during business hours when not in use. It is expected that student would frequently visit ECOURSES UPRM account to keep up to date with the material and assignments. Not having access to the Internet, is the responsibility of student. Contact Professor so he can provide the material and assignments in digital way.

It is required that students bring a conventional scientific calculator (will not accept cell phones or other electronic devices) to the classroom, laboratories and tests. It is recommended to purchase a USB flash drive to store lectures, assignments and labs.

Evaluation Techniques and Relative Weight:

	Percent
<input checked="" type="checkbox"/> Exams (20 % each)	40
<input checked="" type="checkbox"/> Final exam	20
<input type="checkbox"/> Short quizzes	
<input checked="" type="checkbox"/> Laboratory	15
<input checked="" type="checkbox"/> Oral reports (Technical presentations)	05
<input type="checkbox"/> Monographies	
<input type="checkbox"/> Portfolio	
<input type="checkbox"/> Journals	
<input type="checkbox"/> Projects	
<input checked="" type="checkbox"/> Others, specify: Homework problems	20
TOTAL: 100%	100%

Grading System:

Quantifiable (letters) Not Quantifiable

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

Bibliography:

Engineering Principles of Agricultural Machines, Ajit K. Srivastava, Carrol E. Georing, and Roger P. Rohrabach.

An Introduction to Agricultural Engineering. Lawrence O. Roth, Franklin R. Crow, and Geogr W. A. Mahoney.

B. Bell. Farm Machinery. 4th Edition. Farming Press, United Kingdom. 1996.

A.K. Srivastava, C.E. Goering and R.P. Rohrbach. Engineering Principles of Agricultural Machines. ASAE Textbook Number 6. St. Joseph, Michigan. 1996.

ASAE. ASAE Standards 1999. 46th Edition. American Society of Agricultural Engineers, Michigan. 1999.

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.

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.—.

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.

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.

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.

Includes attachments:

Yes

No