LBRAI2106

2013-2014

Phytotechnie

6.0 credits	50.0 h + 10.0 h	2q

Teacher(s) :	Lambot Sébastien (compensates Bielders Charles) ; Bielders Charles ; Bertin Pierre (coordinator) ; Draye Xavier ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	iCampus
Prerequisites :	Mandatory skills in biology, plant and animal biology, ecology, earth science, economy, plant production, farming systems acquired during the Bachelor of bioengineer and the first year of MS of bioengineer or equivalent. Supplementary skills: soil science, biosphere engineering, systems analysis
Main themes :	Plant culture practices (3 credits) Temperate major crops. Soil evolution and crop evolution through the seasons. Agricultural works (soil management, seeding, fertilizing, weeding, crop protection, harvest). Weed identification in major crops at a young stage and specific identification keys. Mechanization (2 credits) The tractor. Soil management. Seeder. Manure spreader. Soil pulverizer. Harvest machines. Precision agriculture (1 credit). The approach of precision agriculture. Techniques (GIS, GPS, captors). Application (soil, plant pathology, water). Success and adoption requirements.
Aims :	a. Contribution of the activity with regards to the referential of leaning outcomes Control a pool of scientific knowledge in crop production (M1.1, M1.2, M2.2) Control a pool of knowledge in the fied of bioengineering through a quantitative approach, facing a complex problem of agronomy at the scales of the plant and the field (M2.4) Apply a rigorous, innovative and systematic scientific approach in order to deepen a research problem in the field of crop production (M3.3, M3.4) b . Specific formulation for this activity AA program (maximum 10) At the end of this activity, the student will be able to : - Define the agricultural practices in major crops and justify them on the basis of plant physiology and ecophysiology - argue a crop protection method according to environmental and physiological constraints of the crop - criticize the adequacy of plant culture practices in the global frame of the production system - describe the functions and functionning of the main components of the farm tractor - describe the mode of action of the main working soil tools and be able to justify their choic according to the objectives - describe the main components and functionning of seeders, manure spreaders, soil pulverizers and harvest machines - document and discuss the variation sources inside a field plot - identify situations in which precision agriculture make sense *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods :	Plant culture practices Oral exam with previous written preparation. Cross-sectional and synthesis in order to evaluate the sound and critical approach of agricultural practices Mechanization Oral exam with previous written preparation (3 questions) Precision agriculture Written exam
Teaching methods :	Oral teaching, intensively illustrated with slides and schemes, visits to websites (advertising, advices), direct observation of engine parts, plant dessecting Field visits with specialist of agriculture services and farmers
Content :	Plant culture practices (20h + 10h) Rotation. Soil preparation and seeding. Organic and mineral fertilization. Ecological requirements and culture cycles. Crop protection (weeds, pathogens, pests). Harvest. Environmental impact. Field visits: farms (conventional and organig farming), agriculture services, field trials Mechanization (20h)

	The tractor: benzine, diesel and 2-stroke engines (functioning and characteristics); notions of couple and power; mechanic and hydraulic transmission (clutch, gearbox, drive shaft, power take-off, differentials, wheels and tires, couple converter); hydraulic systems (pumps, engines, circuits); lifting; security, comfort and ergonomy Soil preparation: objectives, types of soil preparation, mode of action of tools, operations and tools Seeders: principles, classical and precision seeders, mechanical and pneumatic seeders, planting machines (potato...) Manure spreaders Soil pulverizers: principles of droplets formation, types of nozzles, types of pulverizers, circulating systems, pulverizer components Harvesting macihines: combined harvester (cereals, maize...), silage-cutter, potato and sugar beet harvesters Precision agriculture (10h) Introduction : definition and motivation Basic components Technologies : computer, geographic information system, GPS, captors and control systems Making the difference between «precision agriculture » and « precision of agriculture » Approch of precision agriculture: variabilty assessment (types of variability, quantifying methods and techniques, modelling), variability management (pH, main nutrient, weeds, pathogens, pests, water and culture management) Evaluation: economic profitability, environmental impact, technology transfer (innovation)
Bibliography :	Mandatory instruction material Syllabus and powerpoint slides available on icampus Additional lectures - Numerous online sources of agriculture services institutions (CIPF, IRBAB, CETIOM, CADCO...) - Destain JP et Bodson B (2013) Livre blanc. Céréales. Université de Liège - Lerat P (1999). Les machines agricoles. Conduite et entretien. Collection 'Agriculture d'aujourd'hui', Editions TEC& mp;DOC - Pierce FJ et Nowak P (1999) Aspects of Precision Agriculture. Advances in Agronomy, 67. Srinivasan (2006) Handbook of Precision Agriculture, Principles and Applications. Harworth Press, New York. - NRC (1997) Precision Agriculture in the 21th Century. National Academy Press,Washington - T. Brase (2005) Precision Agriculture. Thomson, New York.
Cycle and year of study :	> Master [120] in Agricultural Bioengineering
Faculty or entity in charge:	AGRO