

## Faculty of Biological, Agronomic and Environmental Engineering

### BIRA2104 Agricultural mechanisation

[30h+0h exercises] 2.5 credits

This course is taught in the 2nd semester

**Teacher(s):** Charles Bielders  
**Language:** French  
**Level:** Second cycle

#### Aims

At the end of the course, the student will be in a position to :

- describe the functioning of the main components of agricultural tractors
- understand the energy, power, work diagrams and calculate the power efficiency
- calculate force equilibria of agricultural tractors- master the concepts of adherence, traction and effort
- describe the mode of action of the main tillage implements
- describe the main components and the functioning of sowing machines, fertilizer spreaders, sprayers and harvesting machines
- master the principles of precision agriculture

#### Main themes

1) Technical study of agricultural tractors

- engines : description, components, and functioning (thermodynamics, power, torque)
- clutch; gear box and rear
- work, power, energy, efficiency relations
- traction, adherence, effort and power
- equilibria : effort at the hook, load transfer, global efficiency
- hydraulic commands, entrainment

2) Specific constraints of mechanisation with respect to tillage, treatment and harvest

- Conventional and reduced tillage : mode of action, performance, and use of tillage implements
- Methods and equipment for sowing and planting : functioning and comparison of sowing machines
- Equipment for fertilisation and spraying : physical principles, characteristics of the spreading, methods and equipment, control methods
- Methods and equipment for harvest
- Precision agriculture

#### Content and teaching methods

This course, intended for a general audience and therefore mainly descriptive, reviews the main farming machines and tools used for tillage operations, sowing, spreading, spraying and harvest. The emphasis is on the functions and the functioning mechanisms. A brief historical perspective of farm mechanisation and an introduction to precision agriculture will help put into context the current machines and tools. The course will be based on a series of ex-catedra presentation, documented with numerous diagrams and pictures. If time permits, a session will be organised regarding the calculation of tractor equilibria.

**Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)**

Precursory courses Introductory physics (mechanics)

Evaluation The oral exam is preceded by a written preparation. It will consist in the description of the functioning of a tractor part, a tillage tool, a farming machine, etc., based on a diagram provided to the student. A calculation of a tractor equilibrium may be added.

**Programmes in which this activity is taught****BIR2** Bio-ingénieur**Other credits in programs**

<b>BIR22/0A</b>	Deuxième année du programme conduisant au grade de bio-ingénieur: Sciences agronomiques (Technologies et gestion de l'information)	(2 credits)	Mandatory
<b>BIR22/1A</b>	Deuxième année du programme conduisant au grade de bio-ingénieur: sciences agronomiques (Sciences, technologie et qualité des aliments)	(2.5 credits)	Mandatory
<b>BIR22/7A</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Ressources en eau et en sol)	(2 credits)	Mandatory
<b>BIR22/8A</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Intégrée, productions animales, végétales & économie)	(2.5 credits)	Mandatory
<b>BIR22/9A</b>	Deuxième année du programme conduisant au grade de bio-ingénieur : Sciences agronomiques (Protection intégrée des plantes)	(2 credits)	Mandatory