Tárgytematika / Course Description
Agricultural engineering basics

MENB_BÉTA001

Tárgyfelelős neve / Teacher's name: dr. Kacz Károly
Félév / Semester: 2024/25/2
Beszámolási forma / Assesment: Vizsga
Tárgy heti óraszáma / Teaching hours(week): 2/1/0
Tárgy féléves óraszáma / Teaching hours(sem.): 0/0/0

OKTATÁS CÉLJA / AIM OF THE COURSE

The topics of lectures are mainly be applied in the agriculture and food industry. Furthermore, it can allow students to contribute to the sustainable development of agriculture and food security. The subject matter is presented so that student can acquire the essential knowledge of material and energy saving production and, at the same time, they can also take into account the environmentally friendly requirements. Moreover the course encourages individual creativity of students.

TANTÁRGY TARTALMA / DESCRIPTION

Lecture 1. The agricultural research activity at the department of Biosystems and Food Engineering. SI and anglo-american Units and their conversation;

Lecture 2. The role of agricultural engineering practice in management of agricultural technologies: environmentally friendly energy sources, energy balance of crop production;

Lecture 3. The main parts of tractors, thermodynamic principles of combustions engines, turbo charged engines, break test, efficiency;

Lecture 4. Power transmission: clutch, gear box, planetary gear;

Lecture 5. Hydrostatic power transmission: principles and elements of fluid power, hydraulic pumps and motors;

Lecture 6. The hybrid transmission (Hydrostatic-mechanical split solution); steering control system

for autonomous tractor;

Lecture 7. Tillage equipments. Geometry of basic tillage tools, use of primary & secondary tillage machines.PLOUGHS**:** mouldboard plough, disc plough**,** turn-wrest or reversible or one-way plough;SPECIAL PLOUGHS:subsoil plough:chisel plough, ROTARY TILLERS; harrows and cultivators, integrated seed bed cultivators;

Lecture 8. Machines for sowing and planting: mechanical, pneumatic and electric systems, VRA methods;

Lecture 9. Machine of plant protection. Different types of sprayers: hydraulic, air assisted, centrifugal air blast (atomiser) and kinetic energy sprayers; VRA application; special methods using hot vegetable oil, use of machine vision for mechanical weed control;

Lecture 10. Grain Harvesters: Functions: threshing, cutting, separating, cleaning. Forage and hay harvesting machines;

Lecture 11. Machines of harvest of fruits and vegetables: potato, carrot, onion, spinach, beet, melon, tomato, pea, shakers;

Lecture 12. Engineering basics of post- harvest technologies: cleaning, grain-properties, drying and dryers, grain storage, packing & processing;

Lecture 13. Post- harvest handling of fruits, vegetables and root crops;

Lecture 14. Quo Vadis agricultural engineering in the future? (AI, IoT, Unmanned agricultural machinery: UAV,UGV, robots; machine vision)

SZÁMONKÉRÉSI ÉS ÉRTÉKELÉSI RENDSZERE / ASSESMENT'S METHOD

During the semester students need to write four tests in order to assess how well students follow the lectures. If the average of these tests exceeds 60% and the student has attended 70% of the lectures, a mark will be offered. If the student accepts the offered mark, then the student does not have to take the final exam.

At the end of the semester a written final exam will be given. If the answers are not clear or clarification is needed, the teacher has the right to ask oral questions regarding those particular answers.

KÖTELEZŐ IRODALOM / OBLIGATORY MATERIAL

Srivastava, A.K. et al. (2006): Engineering principles of agricultural machines. ASABE

Field, H.M.-Long, J.L. (2018): Introduction to engineering technology. Springer

Saravacos, **G. D.- Kostaropoulos, A. E. (2002): Handbook of Food Processing Equipment. Kluwer Academic Plenum Publishers**

Recommended literature:

Hunt, D.-Wilson, D. (2016): Farm power & machinery management. Waveland Press INC.

Duckett,T.-Pearson, S.-Blackmore, s.-Grieve, B. (2018):Agricultural Robotics: The Future of Robotic Agriculture. UK-RAS White papers. ISSN 2398-4414

AJÁNLOTT IRODALOM / RECOMMENDED MATERIAL