Course Descriptions for the Degree of Bachelor of Science (B.Sc.) in Agricultural Engineering: *Farm Machinery*

Mechanics of Tractor - Implements 3 Cr. Principles of traction mechanics (empirical and semi-empirical methods for traction prediction of rubber wheel and track tractors), Mechanics of farm tractors chassis, Mechanics of hitching systems, Determination of gravitational center and moment of inertia for tractors, Introduction to soil equipment mechanics.
Prerequisite: Fundamentals of Harvesting Machinery 36-30-348, Strength of Materials I 15-12-211.

Technical Drawing I 2 Cr. Introduction, Graphic instrumentations and their use, Graphic geometry, Orthographic drawing and sketching (orthographic views, multi-view drawing (three and six principal views)), Techniques of dimensioning (dimensions, notes, limits and precision), Pictorial drawing and sketching (pictorial methods including: 1) axonometric, with its divisions into trimetric, dimetric and isometric; 2) oblique, with several variations; and 3) perspective, Sectional views and conventions (conventional industrial drafting practices including section views).

Fundamentals of Post-harvest Technology 3Cr. Introduction to engineering principles, Heat transfer (conduction, convection and radiation), moisture and moisture transfer, drying of agricultural products, Refrigeration.
Prerequisite: Thermodynamics I 15-14-210, fluid dynamics 36-12-203.

Farm Machinery 3 Cr. Study of the fundamentals of gasoline and diesel engine systems and their operation and maintenance. Operational skills in the selection and matching of agricultural tractors and equipment. Fundamentals of tillage practices and methods, moldboard plows, disk harrows, field cultivators. Basic knowledge of planting requirements and methods, grain drills, row crop planter, trans-planter, cultivators, sprayers, and fertilizer spreaders. Study of the importance of harvesting machinery in agriculture and different harvesting practices and methods.

Internal Combustion Engines Technology 3 Cr. Study of the fundamentals of gasoline and diesel engine systems and their operation and maintenance, theory of combustion, fuels and lubricants, power and its measurement.
Prerequisite: Physics (I) 20-10-115.

Tractor Technology 3 Cr. Development of the tractor; types of tractors; power trains: ciutches, theory and types of transmissions; tractor hydraulic systems and hitches, Brakes, tractors operational safety precautions.
Prerequisite: Internal Combustion Engines Technology 36-30-236.

Pumps and Pumping Stations 2 Cr. Pumps and their uses in agricultural applications, selection of pumping systems for different water sources, maintenance and servicing pumping stations.

Tillage Equipment 3 Cr. Principles of tillage operations; conventional and conservation tillage systems; primary tillage implements: moldboard, disk, chisel plows; deep tillage implements: subsoilers; secondary tillage implements harrows, field cultivators, rollers, land levelers, active implements: rotary tiller; combined implements; tillage implements draft requirements.
Prerequisite: Tractor **Technology** 36-30-237.

Fundamentals of Planting and Cultivation Machinery 3 Cr. Basic knowledge of planting requirements and methods for various crops, study of grain drills, row crop planter, transplanters, cultivation equipment including field cultivators, sprayers, and fertilizer spreaders.
Prerequisite: Tillage Equipment 36-30-342.

Fundamentals of Harvesting Machinery 3 Cr. Study of the importance of harvesting machinery in agriculture and different harvesting practices and methods for various crops including forage crops harvesters, grain crops, industrial crops, horticultural and tree crops.
Prerequisite: Tillage Equipment 36-30-342.

Agricultural Mechanization 3 Cr. Socio-economic impact of agricultural mechanization programs, agricultural Systems planning and equipment selection techniques, machinery management and economic evaluation of various machine-crop systems.
Prerequisite: Farm Machinery 36-30-226, Industrial Economics and Management 13-10-426.

Machine Elements Design (I) 3 Cr. Design of machine parts by stress and deflection, loading types, columns, impact, theories of fracture, effects of fluctuating stresses and stress concentration, Fatigue, shaft and keys, spring, screws, pins, welded, ball & roll bearings.
Prerequisite: Strength of Materials I 36-20-222; Dynamics 15-12-207.

Machine Elements Design (II) 3 Cr. Belts, chain & sprocket, design of gears, clutches, brakes, cams, universal joint, cylindrical pressure.
Prerequisite: Machine Elements Design (I) 36-30-456.
Seminar 1 Cr. Group discussion of current agricultural engineering topics presented by individual members of the class.

Hydraulic Systems Design 3 Cr. Introduction, basic principles; JIC symbols; hydraulic pumps; hydraulic valves: pressure-control, directional-control and flow-control valves; hydraulic actuators: hydraulic cylinders, hydraulic motors; filters, reservoir and coolers, hydraulic fluids; hydraulic systems
Prerequisite: Fluid Mechanics 36-12-203.

Design Project 2 Cr. Selection and completion of a project under faculty supervision.
Prerequisite: Machine Elements Design (II).

Land Leveling Machinery 3 Cr. Methods of land leveling and application of various machines for land leveling in agricultural situations, technical and economical aspects of land leveling.

Strength of Materials I 3 Cr. Materials science applied to the study of engineering materials and their mechanical behavior in general (such as stress, deformation, strain and stress-strain relations). Strength is considered in terms of compressive strength, tensile strength, and shear strength, namely the limit states of compressive stress, tensile stress and shear stress respectively.
Prerequisite: Static 15-12-153.

Strength of Materials II 2 Cr. The study of mechanics of materials such as: Analysis of stress and strain, unsymmetrical bending and indeterminate beams, columns and energy methods in principle of virtual work.
Prerequisite: Strength of Materials I15-12-303.