AGRICULTURAL CHEMISTRY

Department of agricultural chemistry and quality of crop products named after O.I. Dushechkin

Agrobiological faculty

Lecturer	**Nadiia P. Bordyuzha**
Term	**II-III**
Major	**Bachelor**
ECTS credits	**6**
Control	**Exam**
Class-room hours	**180 hours (of them: lectures – 60 hours, laboratory classes – 60 hours)**

Subject overview

The goal of the course is mastering for bachelor of the agronomy in theoretical knowledge and practical skills into basic of plant nutrition, their chemical composition and nutrients take up, soil properties in interaction with plant nutrition and fertilizers application, fertilizers classifications, fertilizers types and kinds, fertilizers production, fertilizers using and fertilizers influence on environment. And, this discipline helps formation practical skills in determination of the level of the crop nutrients supply, levels of the nutrients supply of the soils, identify of the fertilizers kinds and fertilizers forms, their interaction with soils, determination of the soil need in soil melioration.

Lectures:

1. Agricultural chemistry, its objectives and main tasks.
2. Chemical composition of plants.
3. Plant nutrition.
4. Soil composition, soil property.
5. Soil sorption capacity.
6. The ions exchanges into the soils.
7. Organic regime in soil.
8. Nitrogen regime in soil.
9. Phosphorus regime in soil.
10. Potassium regime in soil.
11. Soil acidity.
12. Specify of soil acidity and plants.
13. Soil alkalinity.
14. Soil chemical melioration.
15. Fertilizers, their properties and classification.
16. Nitrogen fertilizers. Solid and fluid nitrogen fertilizers. Transformation of nitrogen fertilizers.

17. Phosphate fertilizers. Retrogradation. Recommendations for fertilizers application.
18. Potassium fertilizers. Recommendations for fertilizers application.
19. Multinutrient fertilizers. Technology of multinutrient fertilizers application.
20. Micronutrient fertilizers. Modern classification of micronutrients. Chelated micronutrient fertilizers. The specify for its application.
21. Biofertilizers. Its classification, its properties and technologies for application.
22. Organic fertilizers: characteristic and types of fertilizers. Manure and composts.
23. Organic fertilizers: Poultry manure, Green manure, Peat. Technology of organic fertilizers application.
24. Fertilization system. Nutrients balance.
25. Fertilizers and environment protection.

Laboratory classes:

1. Plant analysis. The principles of plants sampling and handling. Determination of necessity of fertilizers application using analysis data.
2. Diagnosis of plant nutrition and fertilizers requirements**.**
3. Soil analysis. The principles of soil sampling and handling. Establishment of regularity between soil nutrient content and fertilization.
4. The determination of the nitrate-nitrogen in the soil.
5. The determination of the mobile phosphorus and exchangeable potassium by Chyrikov method.
6. The determination of neutralizing value of liming materials for calculation of the rate of lime materials application.
7. The determination of physical properties of mineral fertilizers
8. Qualitative analysis of nitrogen fertilizers.
9. Methods of nitrogen determination in fertilizers. Quantitative analysis of nitrogen mass quota of nitrogen in ammonium salts (in ammonium form using formaldehyde).
10. Qualitative analysis of phosphorus fertilizers.
11. Quantitative determination of total phosphorus in fertilizers using yellow phosphorus-vanadiummolybdenum complex.
12. Qualitative analysis of potassium fertilizers.
13. Methods of potassium determination in fertilizers. Quantitative determination of potassium in fertilizers using flame photometry.
14. Qualitative analysis of compound and microfertilizers.
15. Fertilizers determination test.
16. Organic fertilizers: characteristic and types of fertilizers.
17. Fertilizers distribution in crop rotation and determination of the farm saturation with organic and mineral fertilizers.
18. Balance-sheet method of fertilizers rate determination.
19. Ecology-agrochemical estimation of soils.

AGRICULTURE

Department of Agriculture and Herbology

Agrobiological Faculty

Lecturer	**Pavlov O. S.**
Term	**2**
Major	**Bachelor degree**
ECTS credits	**6**
Control	**Exam**
Class-room hours	**180 hours (of them: lectures – 60 hours, laboratory classes – 60 hours)**

Subject overview

The main purpose of agriculture is the efficient use of land, preservation, and improvement of soil fertility, obtaining a stable, energetically, and economically feasible yield of agricultural crops from a unit of area. The main purpose of this course is to help the future generation to improve soil fertility, agricultural productivity and yield and minimize crop losses. By considering agriculture as an applied science, students gain an understanding of factors affecting plant growth; soil fertility indicators; laws of agriculture; scientifically based crop rotations; measures, methods, and systems of soil tillage; agrotechnical requirements of agricultural crops before sowing; crop agrotechnical care measures; and anti-erosion measures.

Lectures:

1. Agriculture – food, energy, and environmental safety of Ukraine
2. Scientific bases of agriculture.
3. Factors affecting plant growth and laws of agriculture.
4. Living conditions of agricultural plants and methods of their regulation.
5. Scientific bases of crop rotations.
6. Placement of major field crops and fallow field in crop rotation.
7. Classification of crop rotations.
8. Design, introduction, and development of crop rotations.
9. Theoretical foundations of tillage.
10. Technological operations (processes) in tillage.
11. Measures (techniques) of tillage.
12. Tillage systems.
13. The system of primary tillage.
14. The system of pre-sowing tillage for spring crops.
15. The system of post-sowing tillage.
16. Minimization of tillage.
17. Conservation tillage.
18. Concepts of farming systems, their development and current state.

Laboratory classes:

1. Determination the structure of the treated soil layer by the method of saturation in cylinders. Determination of bulk density of soil.
2. Determination of soil penetration resistance.
3. Determination of soil viscosity by the method of MO Kaczynski.
4. Determination of soil plasticity, particle size distribution and soil consistency by the Atterberg method.
5. Determination of soil aggregation according to Savvinov (dry sieving) and water-stable aggregates (wet sieving).
6. Determination of soil moisture, total moisture supply and its productive part.
7. Determination of soil water permeability.
8. Methods of crop rotation design. Drawing up a crop rotation scheme.
9. Characteristics of the Polissya zone. Polissya crop rotations.
10. Characteristics of the Forest-Steppe zone. Forest-steppe crop rotations.
11. Characteristics of the Steppe zone. Steppe crop rotations.
12. Implementation of a new improved crop rotation on the farm. Compilation of the rotation table.
13. Implementation of the primary tillage system for agricultural crops.
14. Implementation of the pre-sowing tillage system for agricultural crops.
15. Implementation of the post-sowing tillage system for agricultural crops.

BOTANY

Department of Botany, Dendrology and Forest Tree Breeding

Educational and Scientific Institute of Forestry and Landscape-Park Management

Specialty 201 Agronomy

Lecturer	**Associate Professor, PhD in Biological Sciences A. Tertyshnyi**
Term	**2**
Major	**Bachelor or Master degree**
ECTS credits	**5**
Control	**Exam**
Class-room hours	**150 hours (of them: lectures – 45 hours, practical or laboratory classes – 60 hours)**

Subject overview

Aim is to study the laws of development of plants as major components of biosphere. **Tasks** are

- to study botanical terminology and methods of investigation of plants that are necessary to study plants on practice; to form for student's general vision of the plant world.
- to learn, to analyze and to work with the literature and botanical objects;
- to learn a technique of experimental research of botanical objects in laboratory and in practice;
- to learn the laws of morphological and anatomical structure and development of plants and microorganisms;
- to learn a technique of identification of plants, their taxonomy;
- to learn and to analyze the botanical phenomena, changes and to form the appropriate conclusions.

As a result of teaching of academic subject the student

has to know terms, systematic and main groups of plants;

can operate on the botanical terminology and methods of investigation of plants that are necessary to study plants on practice. The variety of plants induces the study of specific features of different groups of plants, their development, phylogenic relations and value for agriculture.

Competence acquisition:

Integral competence (IC):

The ability to solve complex specialized tasks and practical problems in agronomy, which involves the application of theories and methods of the relevant science and is characterized by the complexity and uncertainty of conditions.

General competences (GC):

GC 1. The ability to realize one's rights and responsibilities as a member of society, to realize the values of a civil (free democratic) society and the need for its sustainable development, the rule of law, the rights and freedoms of a person and a citizen in Ukraine.

GC 3. Ability to abstract thinking, analysis and synthesis.

GC 5. Ability to communicate in a foreign language.

GC 6. Knowledge and understanding of the subject area and understanding of professional activity.

GC 7. Ability to apply knowledge in practical situations.

GC 8. Skills of performing safe activities.

GC 9. Ability to search, process and analyze information from various sources.

GC 11. Efforts to preserve the environment.

Professional competences of the specialty (PC):

PC 3. Knowledge and understanding of basic biological and agrotechnological concepts, rules and theories related to the cultivation of agricultural and other plants.

PC 5. The ability to evaluate, interpret and synthesize theoretical information and practical, production and research data in the fields of agricultural production. Ability to apply methods of statistical processing of research data related to technological and selection processes in agronomy.

Program learning outcomes (PLO):

PLO 2. Strive for self-organization and self-education.

PLO 5. Conduct a literature search in Ukrainian and foreign languages and analyze the information obtained.

PLO 9. To possess at the operational level, the methods of observation, description, identification, classification, as well as the cultivation of objects and maintaining the stability of agrocenoses with the preservation of natural diversity.

PLO 16. To organize effective and safe working conditions.

Lectures:

1. Introduction to botany.

2. Propagation. Plant systematic. Introduction to systematic. LUCA, Bacteria, Arkarya.

3. Amorphea: Fungi. Archaeplastida: Glaucophyta, Rhodophyta, Viridiplantae. Nonvascular & vascular seedless Embryophyta.

4. Spermatophyta, Gymnospermatophyta . General characteristic and classification of Flowering plants (Magnoliophyta, APG IV) Characteristic of Magnoliophyta families (APG IV). ANA GRADE Nymphaeales Nymphaeaceae Austrobaileyales Schisandraceae MAGNOLIIDS Piperales Aristolochiaceae Piperaceae Magnoliales Magnoliaceae Laurales Lauraceae MONOCOTSAcorales Acoraceae Alismatales Alismataceae Araceae Butomaceae Liliales Liliaceae Asparagales Amaryllidaceae Asparagaceae Iridaceae Orchidaceae Zingiberales Zingiberaceae Poales Bromeliaceae Cyperaceae Juncaceae Poaceae EUDICOTS Ranunculales Berberidaceae Papaveraceae Ranunculaceae SUPERROSIDS Saxifragales Grossulariaceae ROSIDS Vitales Vitaceae Fabales Fabaceae Rosales Cannabaceae Elaeagnaceae Moraceae Rosaceae Urticaceae Fagales

Betulaceae Fagacea Juglandaceae Cucurbitales Cucurbitaceae Malpighiales Euphorbiaceae Myrtales Lythraceae Sapindales Rutaceae Malvales Malvaceae Brassicales Brassicaceae Resedaceae.

5. Theme 3. Characteristic of families (APG IV).SUPERASTERIDS Caryophyllales Amaranthaceae Caryophyllaceae Polygonaceae Portulacaceae ASTERIDS Ericales Actinidiaceae Ericaceae Gentianales Apocynaceae Boraginales Boraginaceae Solanales Solanaceae Lamiales Lamiaceae Oleaceae Orobanchaceae Pedaliaceae Asterales Asteraceae Dipsacales Adoxaceae Caprifoliaceae.Apiales Apiaceae.

6. Elements of Phytocenology.

7. Elements of Phytogeography.

Classes:

(practical, laboratory classes)

1. Bacteria, Viruses, Algae.
2. Fungi. Chytridomycota, Chytridiomyocetes. Oomycota, Oomycetes. Zygomycota. Ascomycota, Ascomycetes. Basidiomycota, Basidiomycetes. Lichens.
3. Bryophyta, Equisetophyta, structure, life cycle.
4. Magnoliophyta. Main peculiarities and classification.
5. Flower morphology. Formula and diagram of flower. Types of inflorescences.
6. Anatomy of flower. Structure of stamen, ovary and seed embryo.
7. Seed formation. Seed structure of monocots and dicots plants.
8. Fruit formation. Structure and classification of fruits. Collective fruit.
9. Methodology of herbarization. Plan of morphological analysis. Plant identifying.
10. Plant identifying of family Ranunculaceae.
11. Plant identifying of family Berberidaceae, Papaveraceae, Portulacaceae, Caryophyllaceae.
12. Plant identifying of family Amaranthaceae, Polygonaceae.
13. Plant identifying of family Betulaceae, Juglandaceae.
14. Plant identifying of family Actinidiaceae, Ericaceae.
15. Plant identifying of family Cucurbitaceae, Brassicaceae, Resedaceae.
16. Plant identifying of family Moraceae, Cannabaceae, Urticaceae, Euphorbiaceae.
17. Plant identifying of family Lythraceae, Adoxaceae.
18. Plant identifying of family Fabaceae, Rutaceae, Elaeagnaceae.
19. Plant identifying of family Vitaceae, Apiaceae, Caprifoliaceae.
20. Plant identifying of family Boraginaceae, Solanaceae, Pedaliaceae.
21. Plant identifying of family Lamiaceae, Asteraceae.
22. Plant identifying of family Iridaceae, Liliaceae.
23. Plant identifying of family Amaryllidaceae.
24. Plant identifying of family Asparagaceae, Orchidaceae, Bromeliaceae.
25. Plant identifying of family Zingiberaceae, Juncaceae, Cyperaceae.
26. Plant identifying of family Poaceae.
27. Flora. Main ecological factors. Plant distribution.
28. Elements of Phytocenology.

GENETICS

Department of Genetics, breeding and seed production named after Prof. M.O. Zelensky

Agrobiological faculty

Lecturer	**Zaika E.V.**
Term	**Semester 3**
Major	**Bachelor**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**120 hours (of them: lectures – 30 hours, practical or laboratory classes – 30 hours)**

Subject overview

Genetics is a basic discipline, the knowledge of which is necessary for a complete understanding of biological processes and phenomena in living organisms. The discipline is formed in order to consistently acquaint students with modern ideas about the laws of heredity and variability at different levels of the organization of living matter, ways of their practical use in breeding, seed risiing and applied genetics. In their work, future specialists should be oriented in such concepts as heterosis, polyploidy, induced mutagenesis, recombinogenesis, cytoplasmic male sterility. The use of modern biotechnological developments and achievements of genetic engineering is impossible without understanding the processes of storage and transmission of hereditary information. The use of molecular markers is impossible without knowledge of genetic molecular genetics occurring in the cell at the level of DNA, RNA and proteins.

Purpose the formation of students' modern ideas about the laws of heredity and variability at different levels of the organization of living matter, ways of their practical use in breeding and seed production.

Objectives expansion of knowledge about the main modern genetic concepts and processes, which are necessary for practical selection work and scientific work in research institutions, formation of skills that allow obtaining theoretical and practical knowledge in the analysis of genetic tasks and problems.

Lectures:

1. History of genetics. Mendel's laws/
2. Cytological bases of heredity.
3. Inheritance in the interaction of non-allelic genes4-5. Inheritance in the interaction of non-allelic genes.
6. Concept of nucleic acids. Functions of NC. DNA replication.

7. Implementation of genetic information. Genetic code. Transcription and translation.

8. Regulation of gene activity.

9-10. Organization of genomes and technology of their study.

11-12. Types of variability.

13. Genetics of populations.

14-15. Inbreeding and heterosis.

Classes:

(practical, laboratory classes)

1. Problems on mono- and dihybrid crossing.
2. Mitosis. Meiosis.
3. Complementary interaction of genes.
4. Epistatic interaction of genes.
5. Polymer interaction of genes.
6. Linked inheritance of genes7. Karyotype.
8. DNA structure. Replication.
9. Genetic code. Point mutations. (problem solving).
10. Implementation of genetic information.
11. Gene structure.
12. Genetic engineering.
13. Mutational variability. Polyploidy. Colchicine as a directed mutagen.
14. Solving problems on population genetics.
15. Schemes for obtaining hybrids on the basis of male sterility.

GREENHOUSE'S TECHNOLOGIES

Department of vegetable Growing and Soil under Cover

Agrobiological faculty

Lecturer	**Sleptsov Y.**
Term	**4**
Major	**Bachelor degree**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**120 hours (of them: lectures – 15 hours, practical classes – 30 hours)**

Subject overview

The different types of greenhouses, covering materials, construction elements of greenhouses and growing vegetable crops in Greenhouses are studied.

Lectures:

1. The value and capacity of Protected cultivated.
2. Construction elements of Greenhouses.
3. Hydroponics.
4. Tomato growing in film Greenhouses.
5. Tomato growing in winter Greenhouses.
6. Cucumber growing in Greenhouses.
7. Eggplant and pepper growing in Greenhouses.

Practical classes:

1. Construction elements of Greenhouses.
2. Greenhouse's film, different types.
3. Agro fiber for Protected Cultivated.
4. Polycarbonate for Greenhouses.
5. Glass for Greenhouses.
6. Hydroponic substrates.
7. Lamps and artificial lightening in Greenhouses.

8-9. Seedling growing.

10. Hydroponics solutions.
11. Pest management in Greenhouses.
12. Tomato growing in Greenhouses. Cucumber growing in Greenhouses.
13. Film Greenhouses.
14. Winter Greenhouses.

HERBOLOGY

Department of Agriculture and Herbology

Agrobiological Faculty

Lecturer	**Babenko A. I.**
Term	**2**
Major	**Bachelor degree**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**120 hours (of them: lectures – 30 hours, laboratory classes – 30 hours)**

Subject overview

During the course, the students acquire common knowledge about basic concepts and laws of herbology, composition and structure of agrophytocenoses; system of relationships between different species, the competitive ability of cultivated plants; methods of accounting and assessment of potential and actual weediness of arable land; different groups of weeds (ephemers, early spring, late spring, winter, winter, biennial and perennial) and methods of combating them (physiochemical, chemical, etc.). The biological classification, according to which grouping is based on the characteristics of growth, flowering, and fruiting, is considered in detail. The characteristics of each group of weeds, the agricultural crops most frequently encountered, the agro-technical and chemical means used to control them shall be indicated.

The latest achievements in the field of synthesized herbicides are studied. The main focus is on integrated weed control in the country's main field crops, perennials, oil and medicinal crops, etc. in close connection with specific biotopes (arable land, meadows, pastures, ponds, etc.).

The student will be able to: identify common types of weeds in Ukraine by seeds and plants in different phases of their development; account potential and actual weediness of the fields, make a map of the weediness of the fields; implement in practice a system of field weed control measures adapted to specific conditions; assess the quality of field weed control works.

Lectures:

1. Plant communities.
2. Competitiveness of cultivated plants in agrophytocenoses.
3. The concept of weeds and their harmfulness.
4. Ecological and biological properties of weeds.
5. Systematic measures of weed control.
6. Precautionary method of weed control in agrophytocenoses.
7. Exterminating method of weed control.

Laboratory classes:

1. Study of the main types of weeds, their seeds, and seedlings.
2. Analysis of climatic conditions for the formation of agrophytocenosis and construction of a phenological map of the scheme of growth and development of cultures.
3. Weed emergence forecast. Phytocoenotic role.
4. Analysis of weed species composition, determination of agrotype and weed class of crops.
5. Development of a system of mechanical weed control measures.
6. Development of chemical weed control measures.
7. Study of biological means of weed control.
8. Evaluation of the optimal choice of weed control measures.

INORGANIC AND ANALYTICAL CHEMISTRY

Department of Analytical and Bioinorganic Chemistry and Water quality

Agrobiological faculty

Lecturer	**Dr. Olha O. Kravchenko**
Term	**1st semester**
Major	**Bachelor degree**
ECTS credits	**5**
Control	**Exam**
Class-room hours	**150 hours (of them: lectures – 30 hours, practical or laboratory classes – 75 hours)**

Subject overview

The discipline includes theoretical provisions of modern inorganic chemistry and features of the chemistry of biogenic elements, such as Hydrogen, halogens, Oxygen, Sulfur, Nitrogen, Fluorine, Carbon, metals. Chemical processes involving these elements and their compounds are considered from the standpoint of electrolytic dissociation, hydrolysis, oxidation-reduction processes, and the possibility of forming complex compounds. The main classes of inorganic compounds are considered: oxides, hydroxides, acids, salts. The analytical module includes the basics of qualitative and quantitative chemical analysis. Quantitative methods of gravimetry, acid-base titration, redoxmetry, complexonometry are considered.

Goal is to build a good foundation in chemical knowledge that allows to make qualitative and quantitative inquiries into topics in natural science.

Lectures:

1. Introduction. General notions, stoichiometrical laws and types of chemical reactions.
2. Atomic structure of chemical elements. Electronic formulas.
3. The Periodic Law and Periodic Table of chemical elements.
4. . Chemical bonding and structure of molecule. Chemical kinetics and equilibrium.
5. Solutions, their nature and properties. Hydrolysis of salts.
6. Red-Ox reactions.
7. General properties of non-metals.
8. General properties of metals.
9. Coordination compounds.
10. Introduction to Analytical chemistry.
11. Qualitative analysis.
12. The main principle of qualitative analysis of unknown substances.

13. Theoretical and experimental foundation of Quantitative analysis.
14. Titrimetry (volumetry, volumetric analysis). Neutralization method.
15. Oxidation-reduction (Redox) Titration (Redoxmetry). Complexometric Titration.

Classes:

(practical, laboratory classes)

1. The main classes of inorganic substances (4 hours).
2. Control Test "Classification of Inorganic Substances" (2 hours).
3. Atomic structure. Chemical bonding (2 hours).
4. Control Test "Atomic Structure. Electron configurations of atoms. Chemical bonding" (2 hours).
5. Theory of electrolytic dissociation (2 hours).
6. Control Test "Theory of electrolytic dissociation" (2 hours).
7. Lonic product of water. Hydrolysis of salts (4 hours).
8. Control Test "Hydrolysis of Salts" (2 hours).
9. Oxidation-reduction reactions (8 hours).
10. Control Test "RedOx reactions with products" (2 hours).
11. Control Test "RedOx reactions without products" (2 hours).
12. Complex (coordination) compounds (4 hours).
13. Control test "Complex (coordination) compounds" (2 hours).
14. The first group of Cations (2 hours).
15. The second group of Cations (5 hours).
16. The third group of Cations (4 hours).
17. The fourth group of Cations (2 hours).
18. The first group of Anions (2 hours).
19. The second group of anions (2 hours).
20. The third group of Anions (2 hours).
21. Control Test "Analysis of Unknown substance" (4 hours).
22. Preparation of solution (4 hours).
23. Control test "Concentration of Solutions" (2 hours).
24. Determination of alkali solution normality (4 hours).
25. Determination of Water Hardness (4 hours).

PLANT SCIENCE

Department of Plant Science

Agrobiological faculty

Lecturer	**Svitlana Kalenska**
Term	**4, 5, 6**
Major	**Bachelor**
ECTS credits	**9**
Control	**Exam**
Class-room hours	**270 hours (of them: lectures – 90 hours, practical or laboratory classes – 105 hours)**

Subject overview

In a global context, the main objective of crop production is to meet the growing demand of the population for food, animal feed for the livestock industry, and raw materials for various industries. Crop production as a scientific discipline studies diverse types, forms, and varieties of field crops, as well as the theoretical foundations and practical measures for achieving high and sustainable yields with minimal labor and material resources.Crop production is based on fundamental sciences such as soil science, microbiology, plant physiology, agronomy, agrochemistry, botany, phytopathology, entomology, mechanization of crop processes, breeding, land reclamation, and others. In turn, crop production serves as the foundation for other disciplines such as agricultural economics and organization.The main goal of the discipline is to prepare students for future independent professional work involving the comprehensive elements of agricultural production: crops, soil, fertilizers, machinery, land reclamation, and plant protection.

Lectures:

1. Crop production as a branch of agricultural production.
2. Ecological and biological foundations of crop production.
3. Agrobiological foundations of intensive cultivation technologies for agricultural crops.
4. Agrotechnological foundations of crop production.
5. Fundamentals of crop yield programming.
6. Fundamentals of seed science.
7. Winter cereals.
8. Spring cereals and flake crops.
9. Legumes.
10. Tuber crops.
11. Root crops.

12. Watermelons.
13. Sugar crops.
14. Sugar beets.
15. Oilseeds.
16. Essential oil crops.
17. Fiber crops.
18. Aromatic crops.
19. Medicinal crops.
20. Energy crops.

Classes:

(practical, laboratory classes)

1. Forecasting crop yield. Calculation of assimilation coefficients of fertilizers by crops and potential yield based on solar radiation input.
2. Calculation of phytometric indicators for targeted crop yield.
3. Compilation of the agronomic section of the technological map for programmed cultivation of field crops.
4. Determination of seed quality characteristics. Sampling.
5. Determination of seed quality characteristics: purity and impurities, germination rate, viability, moisture content, 1000-seed weight, disease infestation, pest infestation. Determination of seed authenticity (varietal laboratory control).
6. Determination of seed viability and preparation of seed quality documents.
7. General characteristics of cereal crops. Morphological and biological differences in grains of the first and second groups. Genus differences in grains of the first and second groups in terms of kernel anatomy. Genus differences in grains of the first and second groups in terms of sprouts, shoots, ears, and awns. Growth stages and phases of organogenesis in cereal crops.
8. Wheat. Systematics and morphological characteristics. Types of wheat. Determination of varieties of soft and hard wheat. Economic and biological characteristics of the most common and promising wheat varieties.
9. Rye. Systematics and morphological characteristics of plants. Species and varieties. Economic and biological characteristics of the most common varieties.
10. Triticale. Systematics and morphology of plants.
11. Barley. Systematics and morphological characteristics. Subspecies and groups. Determination of barley varieties. Economic and biological characteristics of varieties.
12. Oats. Systematics and morphology of plants. Species of oats. Determination of oat grain type, color, and huskiness. Varieties and their economic and biological characteristics.

13. Millet. Systematics and morphological characteristics. Species, subspecies, and varieties of millet. Economic and biological characteristics of common millet varieties.
14. Maize. Botanical characteristics. Systematics and morphological characteristics of plants. Features of ear and tassel structure. Determination of productivity based on tassels. Determination of maize subspecies and varieties. Economic and biological characteristics of maize hybrids and varieties.
15. Sorghum. Botanical characteristics. Systematics and morphology. Economic and biological characteristics of groups, varieties, and hybrids.
16. Rice. Systematics and morphological characteristics. Features of root system structure. Subspecies, groups, varieties. Varieties.
17. Buckwheat. Systematics and morphology of plants. Determination of species and varieties. Economic and biological characteristics of varieties.
18. Development of agronomic sections of technological maps for the cultivation of grain crops: winter wheat, spring barley, maize, buckwheat, and others using specific farms in Ukraine as examples.
19. General characteristics of cereal legume crops. Morphological features. Identification of cereal legume crops based on seeds, seedlings, leaves, and fruits.
20. Peas. Systematics and morphological characteristics. Identification of species and varieties. Economic and biological characteristics of cultivars.
21. Soybeans. Systematics and plant morphology. Subspecies, varieties, and testing groups. Economic and biological characteristics of cultivars.
22. Kidney beans. Systematics and morphological characteristics. Species and varieties. Economic and biological characteristics of cultivars.
23. Lupin. Systematics and morphology. Species and varieties. Determination of seed alkaloid content. Cultivars and their economic and biological characteristics.
24. Forage legumes, lentils. Systematics and morphological characteristics. Species, subspecies, varieties, and their characteristics.
25. Chickpeas, cowpeas. Systematics and morphological features. Species, subspecies, varieties, and their characteristics.
26. Development of agrotechnical sections of cultivation technology cards for peas, soybeans using a specific farm as an example.
27. Fodder beets, fodder carrots, rutabagas, turnips. Systematics and morphological characteristics. Anatomical structure of root crops. Identification of root crops based on seedlings, fruits, and seeds. Determination of stand density, biological yield, and its structure.
28. Potato. Systematics and morphological characteristics of organs. Structure of tubers. Economic and biological characteristics of potato varieties. Determination of dry matter and starch content in tubers.
29. Jerusalem artichoke. Morphological characteristics. Development of the agronomic section of the technological map for potato cultivation using a specific farm as an example.

30. General characteristics. Determination of pumpkins, watermelons, and melons based on seeds, sprouts, and fruits.
31. General characteristics of root crops. Sugar beets. Morphological and anatomical features of first-year sugar beet plants.
32. Sugar beets. Morphological and anatomical features of second-year sugar beet plants.
33. Sugar beets. Technological map for growing sugar beets. Biological yield and its structure, determination of plant density, sowing rate, seeding unit, juice purity, and sugar yield.
34. General characteristics of oil crops. Determination of oil crops based on fruits, seeds, sprouts, stems, leaves.
35. Botanical-morphological characteristics of sunflower. Features of sunflower plant structure, determination of sunflower groups, seed hulling and shelling. Technological map for sunflower cultivation.
36. Botanical-morphological characteristics of mustard, rapeseed, and safflower.
37. Botanical-morphological characteristics of poppy, castor oil plant, and flax.
38. Botanical-morphological characteristics of sesame, peanuts, pearl millet, and quinoa.
39. Botanical-morphological characteristics of essential oil crops.
40. Bast fiber crops. Botanical-morphological characteristics of flax.
41. Botanical-morphological characteristics of hemp, cotton, and kenaf.
42. Botanical-morphological characteristics of tobacco, snuff, and hops.
43. Botanical-morphological characteristics of medicinal crops.
44. Botanical-morphological characteristics of phytoenergy crops.

SOIL SCIENCE WITH THE BASICS OF GEOLOGY

Department of Soil Science and Soil Conservation

Agrobiological Faculty

Lecturer	**Yuriy Kravchenko**
Term	**3, 4**
Major	**Bachelor**
ECTS credits	**6**
Control	**Exam**
Class-room hours	**180 hours (of them: lectures – 60 hours, practical or laboratory classes – 60 hours)**

Subject overview

This course is an introductory designed course for the Bachelor student, which provides the basic concepts of all aspects of geology and soil science. It encompasses: Earth's origin; internal and external Earth's dynamics; minerals and rocks – formation, composition, diagnostics and properties changes; agronomic ores properties and application; anthropogenic influence on geologic environment. The course presents the soil composition and genesis; physical, chemical, and biological properties; soil water; classification and mapping; soil conservation; management practices; and soil fertility and productivity (soil testing, use of fertilizers and liming), soil quality assessment. The course gives practical experience as an aid in developing understanding of the minerals, rocks and soils as natural bodies, the use of which has an influence on environmental, human society and life in general.

Lectures:

1. Introduction to course. What is soil?
2. Internal and external spheres of the Earth.
3. Magmatic, metamorphic and sedimentary processes.
4. Endogenic geological processes.
5. Weathering processes and soil formation.
6. Exogenic geological processes.
7. Soil formation and soil processes.
8. Soil classification.
9. Soil taxonomy and morphology.
10. Overview of soil properties and ecosystem functions.
11. Soil physical properties 1. Texture, structure and soil water categories.
12. Soil ecology 1. Soil communities, plants, macro- and microanimals.
13. Soil ecology 2. Fungi, bacteria and archaea, microbial interactions.
14. Soil organic matter 1.
15. Soil organic matter 2.
16. Soil colloids.

17. Sorption, cation and anion exchange.
18. Soil acidity and alkalinity.
19. Soil salinity.
20. Soil physical properties 2. Soil structure, density, pore space, tillage.
21. Soil water.
22. Soil air and temperature.
23. Soil productivity and its evaluation.
24. Soils of the Forest zone.
25. Soils of the Forest-Steppe zone.
26. Soils of the Steppe zone.
27. Soils of the Arid-Steppe zone.
28. Saline soils.
29. Alluvial and meadow soils.
30. Soil erosion, degradation and productivity management.

Classes:

(practical, laboratory classes)

1. The general mineral properties and crystallography.
2. Soil minerals.
3. The general rock properties and their formation
4. Rocks as natural formations
5. Quaternary deposits and agronomic ores.
6. Lab Safety. Soil sampling.
7. Forms (categories) of soil water.
8. Soil hygroscopic moisture determination.
9. Soil granulometry and particle size distribution.
10. Methods of soil texture determination.
11. International pipette and hydrometer methods.
12. Soil organic matter determination.
13. Humus balance.
14. Cation exchange capacity determination.
15. Soil acidity and its amendment.
16. Active and exchangeable acidity determination.
17. Hydrolytic acidity determination.
18. Soil alkalinity and salinity.
19. Soil extract analysis.
20. Reclamation of saline soil.
21. Soil productivity assessment.
22. Soil distribution in Ukraine.
23. Forest zone soils properties and management.
24. Forest-Steppe zone soils properties and management.
25. Steppe zone soils properties and management.
26. Arid-Steppe zone soils properties and management.
27. Saline soil properties and management.
28. Alluvial and meadow soils properties and management.

STANDARTIZATION AND QUALITY MANAGEMENT OF PLANTING PRODUCTS

Department of Storage, Processing and Standardization of Plant Products after prof. B.V. Lesik

Agrobiological Faculty

Lecturer	**Voitsekhivskyi V.I.**
Term	**5 Semester**
Major	**Bachelor**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**120 hours (of them: lectures – 30 hours, practical classes – 30 hours)**

Subject overview

The discipline includes the study of the following issues: goals and objectives of standardization, the essence of standardization as a science, methodological foundations of standardization, issues of product quality, standardization of product quality indicators and control methods, international standards. General information about domestic and foreign experience of product quality management, product certification and metrological support. Mastering the current requirements for crop production with the aim of planned production of competitive products. Development of effective product quality management measures in the production of high-quality, ecologically safe, organic and competitive products. Mastering the principles and procedures of product certification for the domestic market and export. Peculiarities of the creation and implementation of the ISO 9000 standards system in production with subsequent accreditation of the quality management system.

Lectures:

1. Introduction.
2. The theoretical basis of standardization and of quality management.
3. Organizational principles of standardization in Ukraine.
4. Methodical bases of standardization.
5. Qualimetry the scientific basis for evaluating the quality.
6. Technical quality control.
7. Quality management.
8. Standardization of cereal and pulse crops.
9. Standardization of fruit crops.
10. Standardization of vegetable crops.
11. Standardization of technical crops.

12. Standardization seeds and planting materials.
13. Standardization of fertilizers.
14. Basics product certification.
15. Fundamentals of metrology, legal and economic aspects of standardization.

Practical classes:

1. Standardization of wheat grain.
2. Standardization of barley grain.
3. Standardization of legumes culture(soybeans, peas).
4. Standardization of cereals culture (buckwheat, oats).
5. Standardization of oilseeds culture (sunflower, rape).
6. Standardization of cereal seeds.
7. Standardization of vegetable seeds.
8. Standardization of fruit cultures (apples, pears).
9. Standardization of stone fruit cultures (peaches, apricots, plums).
10. Standardization of berries cultures (strawberries, gooseberries, currants).
11. Standardization root cultures (carrots, beets).
12. Standardization of vegetable cultures (cucumber, tomato).
13. Standardization of potatoes.
14. Standardization of cabbage vegetables.
15. Standardization of sugar beet.

TECHNOLOGY OF STORAGE AND PROCESSING OF CROP PRODUCTS

Department of Storage, Processing and Standardization of Plant Products after prof. B.V. Lesik

Agrobiological Faculty

Lecturer	***Sergiy Gunko***
Term	**7 Semester**
Major	**Bachelor**
ECTS credits	**4**
Control	**Exam**
Class-room hours	**120 hours (of them: lectures – 45 hours, laboratory classes – 40 hours)**

Subject overview

The discipline is studied in the final year of the Bachelor's degree in agricultural science, after students have already learned the agronomy of growing various cereal, legume, oilseed, technical, vegetable, and fruit crops. The program includes technology for post-harvest processing, storage, and primary processing of various types of cereal and legume crops for different purposesof processing, as well as fruits, vegetables, potatoes, berries, and technical crops (such as sugar beets, flax and hops). The course curriculum covers the study of crop storability and its ability to yield specific processed products under both favourable growing conditions and deviations from them, as well as how protective factors and agrochemicals affect the quality of fresh or processed products. The basics of drying, cooling, chemical preservation, and storage of grain and other types of products are also covered. The course also examines the impact of growing and post-harvest processing factors on the storability of potatoes and vegetables, the theoretical foundations of long-term storage, and the basics of primary processing of agricultural products. Students will learn how to ensure agricultural products meet certain standards and how to assess the quality of these products in accordance with those standards.

Lectures:

1. Principals of storage and processing of plant products
2. Characteristics of grain mass as a storage object
3. Physical and physiological properties of grain masses. Self-heating of grain masses.
4. Vital activity of grain mass.
5. Post-harvest handling of grain. Grain clearing.
6. Active ventilation of grain.
7. Grain drying: regimes and methods of drying.
8. Storage of grain: ways, regimes and granaries.

10. Basics of grain processing for flour.
11. Technology of bread baking.
12. Technology production of the macaroni goods.
13. technology of the groats production.
14. Plant oil production.
15. Fruits and vegetables as an object of storage.
16. Losses of fruits and vegetables and predicting their shelf life.
17. Technologies of post-harvest processing and storage of potato tubers.
18. Post-harvest handling and storage of root crops.
19. Features of post-harvest handling and storage of onion and garlic.
20. Features of post-harvest handling and storage of different types of cabbage.
21. Basics of processing fruit and vegetable products.
22. Post-harvest handling, storage, and processing of sugar beets.
23. Technology post-harvest handling, storage and processing of flax.

Laboratory classes:

1. Grain sampling, formation of average and daily average samples.
2. Organoleptic (sensory) evaluation of grain.
3. Determination of grain infestation by granary pests and damage by the corn bug
4. Determination of the grain-unit by a litre corn balance.
5. Determination of moisture content in the grain.
6. Determination of impurities in grain (seeds)
7. Identification of types and subtypes of different grains.
8. Determination of quantity and quality of wet gluten in wheat grain.
9. Determination of autolytic activity of grain.
10. Technological calculations for grain and seed cleaning.
11. Technological calculations for grain and seed drying.
12. Active ventilation of grain masses.
13. Calculations for grains (seeds) storage.
14. Quantitative and qualitative accounting of grain.
15. Payments for grain, depending on its quality.
16. Evaluation the quality of groats grain.
17. Determination the quality of flour.
18. Evaluation the quality of flour by laboratory test baking.
19. Determination of the potato quality.
20. Storage of potatoes and vegetables in temporary (field) storage facilities.
21. Organization of storage of fruits and vegetables.
22. Production of sauerkraut.
23. Evaluation of the quality of sugar beets.
24. Evaluation of the quality of flax fibre.