

Appx 2
to the Order of March 23, 2023 № 244


**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF
UKRAINE**

Department of Botany, Dendrology and Forest Tree Breeding

Dean of the Faculty Plant Protection, Biotechnology and Ecology

“**CONFIRMED**”
“ ”  Y. Kolomiets
“ ” 2023

“**APPROVED**”
at the meeting of the department
of Botany, Dendrology and Forest Tree Breeding
Protocol №11 dated “15th of May” 2023


Head of Department
Y. Marchuk

“**REVIEWED**”
Program Coordinator of Plant protection and quarantine


Program Coordinator
M. Pikovskyi

PROGRAM OF THE COURSE

BOTANY

Specialization 202 Plant protection and quarantine
Educational program Plant protection and quarantine
Faculty of Plant Protection, Biotechnology and Ecology
Developer: Associate Professor, PhD in Biological Sciences A. Tertyshnyi

KYIV – 2023

1. Description of the course “Botany”

| Field of knowledge, specialization, educational program, educational degree | | |
|--|-------------------------------------|-------------------------|
| Educational and professional program | Plant protection and quarantine | |
| Educational degree | Bachelor | |
| Specialization | 202 Plant protection and quarantine | |
| Educational program | 20 Agrarian sciences and food | |
| Characteristics of the course | | |
| Type | Compulsory | |
| Total number of hours | 120 <i>hr</i> | |
| Number of ECTS credits | 4 | |
| Number of content modules | 3 | |
| Course project (work) (if applicable) | | |
| Form of assessment | <i>Exam</i> | |
| Indicators of the course for full-time and part-time forms of study | | |
| | Full-time form of study | Part-time form of study |
| Course (year of study) | 1 | |
| Semester | 1 | |
| Lecture classes | 15 <i>hr.</i> | <i>hr.</i> |
| Practical, seminar classes | 30 <i>hr.</i> | <i>hr.</i> |
| Laboratory classes | | <i>hr.</i> |
| Self-study | 75 <i>hr.</i> | <i>hr.</i> |
| Individual assignments | | <i>hr.</i> |
| Number of weekly classroom hours for the full-time form of study | 3 <i>hr.</i> | |

2. Purpose, objectives, and competencies of the course

Purpose is to study the laws of development of plants as major components of biosphere.

objectives 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.

Acquisition of competencies: :

Integrated competency (IC):

Ability to solve complex specialized problems and practical problems of professional activity with protection and quarantine of plants and apply theoretical knowledge and methods of phytosanitary monitoring, review, analysis, expertise, which are characterized complexity and uncertainty of conditions.

General competencies (GC):

GC 2. Ability to apply knowledge in practical situations

GC 3. Knowledge and understanding of the subject area and understanding of professional activity.

Professional (special) competencies (PC): –

Program learning outcomes (PLO):

PLO 4. Have knowledge of the fundamental sections of higher mathematics, biophysics, chemistry (analytical, organic, inorganic, physical and colloid), botany and agrozoology to the extent necessary for understanding the processes of the specialty protection and plant quarantine.

3. Program and structure of the course for:

- complete full-time (part-time) form of study;.

| Names of content modules and topics | Hours | | | | | | | | | | | | | |
|---|----------------|-------|-----------|----|-----|-----|------|-------|----------------|----|-----|-----|------|--|
| | Full-time form | | | | | | | | Part-time form | | | | | |
| | week | total | including | | | | | total | including | | | | | |
| | | | l | p | lab | ind | self | | l | p | lab | ind | self | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| Content Module 1. | | | | | | | | | | | | | | |
| Topic 1. Introduction to Botany. | 1 | 3,5 | 0,5 | 1 | | | 2 | | | | | | | |
| Topic 2. Plant cell | 2 | 3,5 | 0,5 | 1 | | | 2 | | | | | | | |
| Topic 3. Plant tissues. | 3 | 3,5 | 0,5 | 1 | | | 2 | | | | | | | |
| Topic 4. Vegetative organs of plants. | 4 | 3,5 | 0,5 | 1 | | | 2 | | | | | | | |
| Topic 5. Propagation of plants. | 5 | 5 | 1 | 2 | | | 2 | | | | | | | |
| Topic 6. Genarative organs of angiosperm plants. | 6 | 5 | 1 | 2 | | | 2 | | | | | | | |
| Topic 7. Introduction to plant systematic. LUCA, Bacteria, Arkarya. Amorphea: Fungi. Archaeplastida: Glaucophyta, Rhodophyta, Viridiplantae. | 7 | 7 | 1 | 2 | | | 4 | | | | | | | |
| Topic 8. Marschantiophyta, Bryophyta, Anthocerotophyta, Lycopphyta Euphylllophyta, Monilophyta, Spermatophyta: Gymnospermatophyta. Structure, life cycles, biology. | 8, 9 | 7 | 1 | 2 | | | 4 | | | | | | | |
| Total for content module 1 | | 38 | 6 | 12 | | | 20 | | | | | | | |

| Content Module 2. | | | | | | | | | | | | | |
|--|------------|-----|-----|----|--|--|----|--|--|--|--|--|--|
| Topic 1. Angiosperm plants. (Magnoliophyta, APG IV): ANA GRADE, MAGNOLIIDS, MONOCOTS, EUDICOTS, SUPERROSIDS. | 10, 11, 12 | 53 | 6 | 12 | | | 35 | | | | | | |
| Total for content module 2 | | 53 | 6 | 12 | | | 35 | | | | | | |
| Content Module 3. | | | | | | | | | | | | | |
| Topic 1. SUPERASTERIDS, ASTERIDS | 13 | 22 | 2 | 4 | | | 16 | | | | | | |
| Topic 2. Phytogeography. Flora. Areal of plants. Main ecological factors and its influence on plants. | 14 | 3,5 | 0,5 | 1 | | | 2 | | | | | | |
| Topic 3. Phytocoenology. Vegetation. Types of vegetation. Systematic of phytocenoses. | 15 | 3,5 | 0,5 | 1 | | | 2 | | | | | | |
| Total for content module 3 | 15 | 29 | 3 | 6 | | | 20 | | | | | | |
| Total hours | | 120 | 15 | 30 | | | 75 | | | | | | |

4. Practical class topics

| № | Topic title | Number of hours |
|----|--|-----------------|
| 1 | Structure of microscope. Skills at using of microscope. Structure of plant cell. Plastids. Storage materials. Starch and aleirone grains. | 2 |
| 2 | Dermal tissues. Primary dermal tissue. Secondary and tertiary dermal tissues. | 2 |
| 3 | Morphological structure of the root and its modifications. Regions of the root, primary anatomical structure, morphological and anatomical regions of the root. Anatomical structure of the root. Peculiarities of the anatomical structure of root crops. | 2 |
| 4 | Morphological structure of the shoot. Anatomical structure of the stem of monocot. Anatomical structure of the herbal dicot plants. Bundle type of structure. Anatomical structure of spinning plants stem. Macroscopic structure of the woody stem. Anatomical structure of the leafy plant stem. | 2 |
| 5 | Anatomical structure of the maize leaf and <i>Camellia japonica</i> . Peculiarities of the structure of the <i>Pinus sylvestris</i> needle. | 2 |
| 6 | Fungi. Chytridomycota, Chytridiomycetes. Oomycota, Oomycetes. Zygomycota. Ascomycota, Ascomycetes. Basidiomycota, Basidiomycetes. Lichens | 2 |
| 7 | Algae. Chlorophyta, Charophyta, Charophyceae | 2 |
| 8 | Marchantiopsida, Bryopsida. Structure of vegetative and reproductive organs of <i>Lycopodium clavatum</i> , <i>Selaginella selaginoides</i> . Morphological structure of <i>Equisetum arvense</i> . Strobile and spore structure. Polypodiophyta. Structure of sporophyte and gametophyte of <i>Dryopteris filix-mas</i> | 2 |
| 9 | Pinophyta. Pinopsida. | 2 |
| 10 | Flower morphology. Formula and diagram of flower. Types of inflorescences. | 2 |
| 11 | Anatomy of flower. Structure of stamen, ovary and seed embryo. Seed formation. Seed structure of monocots and dicots plants. | 2 |
| 12 | Fruit formation. Structure and classification of fruits. Collective fruit. | 2 |
| 13 | Methodology of herbarization. Plan of morphological analysis. Plant identifying. Plant identifying of Ranunculaceae species. | 2 |
| 14 | Plant identifying of Boraginaceae, Rosaceae, Brassicaceae, Fabaceae. | 2 |
| 15 | Notion of phytocenosis and its structure. Elements of Agrophytocoenology Plant identifying of Liliaceae, Poaceae, Cyperaceae species. | 2 |
| 16 | Total | 30 |

5. Self-study topics

| № | Topic title | Number of hours |
|----|--|-----------------|
| 1 | Theme 1. Introduction to Botany. | 2 |
| 2 | Topic 2. Plant cell | 2 |
| 3 | Topic 3. Plant tissues. | 2 |
| 4 | Theme 4. Vegetative organs of plants. | 2 |
| 5 | Theme 5. Propagation of plants. | 2 |
| 6 | Theme 6. Genarative organs of angiosperm plants. | 2 |
| 7 | Theme 7. Introduction to plant systematic. LUCA, Bacteria, Arkarya. Amorphea: Fungi. Archaeplastida: Glaucophyta, Rhodophyta, Viridiplantae. | 9 |
| 8 | Theme 8. Marschantiophyta, Bryophyta, Anthocerotophyta, Lycophyta Euphylllophyta, Monilophyta, Spermatophyta: Gymnospermatophyta. Structure, life cycles, biology. | 9 |
| 9 | Theme 1. Angiosperm plants. (Magnoliophyta, APG IV): ANA GRADE, MAGNOLIIDS, MONOCOTS, EUDICOTS, SUPERROSIDS. | 20 |
| 10 | Theme 1. SUPERASTERIDS, ASTERIDS | 11 |
| 11 | Theme 2. Phytogeography. Flora. Areal of plants. Main ecological factors and its influence on plants. | 7 |
| 12 | Theme 3. Phytocoenology. Vegetation. Types of vegetation. Systematic of phytocenosises. | 7 |
| 14 | All hours per year | 75 |

6. Samples of control questions, tests for assessing the level of knowledge acquisition by students.

Part 1. Comprehensive questions

1. Androceum and gynoecium. Structure of the stamen, pollen grain, Carpel, and seed embryo.
2. Bundle type of the anatomical structure of the dicot plant stem.
3. Bundle type of the anatomical structure of the monocot plant stem.
4. Characteristic of the higher spore plants and its evolution.
5. Double fertilization of the flower plants and its biological meaning.
6. Fruit. Forming of angiosperm fruit. Structure of the fruit. Types of fruits.
7. Leaf. Anatomical structure of the leaf depending on its functions.
8. Main tissues. Characteristic and functions.
9. Mechanical tissues. Characteristic and functions.
10. Peculiarities of the anatomical structure of the root.
11. Seed. Formation of the seed in the Angiosperms. Structure and types of the seeds.
12. Types of the Forest Steppe vegetation of Ukraine.
13. Ways of the substance penetration to the cell.
14. Flower. Flowering, pollination, fertilization in the Angiosperms.
15. Anatomical structure of the fibre plants exemplified in the *Linum* and *Cannabis*. Examination questions
16. Areal and its types. Flora and vegetation.
17. Family Apiaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
18. Family Asteraceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
19. Family of Amaranaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
20. Family of Cucurbitaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
21. Family of Orchidaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
22. Family Poaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
23. Family Solanaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
24. Signs of the plant communities. Examination questions
25. The life cycle of *Pinus sylvestris* L. Examination questions
26. Theories of the origin of the flower. Examination questions
27. Transitional type of the anatomical structure of the stem. Examination questions

28. Family Fabaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
29. Family Lamiaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
30. Chemical structure of the cell wall and its modifications.
31. Conduction tissues. Phloem and xylem. Types of the vascular bundles.
32. Family Brassicaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
33. Family Caryophyllaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
34. Family Ericaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
35. Family Euphorbiaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
36. Family of Amaryllidaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
37. Family of Boraginaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
38. Family of Cyperaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
39. Family of Liliaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
40. Family of Ranunculaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture.
41. Family of Scrophulariaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture. Examination questions
42. Family Papaveraceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
- .Family Polygonaceae. Botanical characteristic. Meaning of the members of the family for the agriculture. Examination questions
43. Family Primulaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
44. Family Rosaceae. Botanical characteristic. Meaning of the members of the family for the agriculture.
45. Green algae. Characteristic. Relationship of the plants to water and to the soil trophic. Examination questions
46. Leaf, its structure, functions. Morphological types of the leaves.
47. Meiosis. Biological meaning.
48. Mitochondria. Structure and functions.
49. Mitosis. Biological meaning.
50. Nucleus. Structure and functions.

Part 2. Test questions

1. In the cytoplasm there are
 - a) three membranes which divide it into two parts
 - b) two membranes which divide it into three parts
 - c) three membranes which divide it into three parts
 - d) two membranes which divide it into two parts

2. In the structure of cytoplasm there is
 - a) lymph b) epiblema

- 3) The nucleus wall consists of
 - a) one membrane
 - b) three membranes and intermediate layer
 - c) two membranes and intermediate layer
 - d) four membranes and intermediate layer

- 4) The chemical structure of the nucleus consists of
 - a) organic substances
 - b) among nucleic acids dominates RNA
 - c) among nucleic acids dominates DNA

- 5) In the nucleus
 - a) the matrix is the base of the nucleus structure
 - b) the matrix is not the base of the nucleus structure

6. The chemical base of the nucleus is
 - a) proteins, lipoids and RNA
 - b) proteins and RNA
 - c) proteins and lipoids

7. In the structure of cytoplasm there are
- with equal charges
 - with opposite charges
 - with no charges
8. In the plant nucleus there is
- the hyaloplasm with channels, vesicles, cisterns
 - no channels, vesicles, cisterns in the hyaloplasm
 - no hyaloplasm
9. The base structure elements of the cytoplasm are
- no nucleolonemas
 - nucleolonemas
10. DNA of the nucleus is located in
- the chromosomes
 - the cell wall
11. Cytoplasm is
- live part of the plant cell
 - dead part of the plant cell
12. The cell wall is
- the product of the cell life activity
 - the product of the cell life resting
13. The cytoplasm consists of
- lipoids, carbohydrates, mineral part
 - only RNA, DNA, lipoids
 - proteins, RNA, DNA, lipoids, carbohydrates, mineral part
14. The cell wall consists of
- pectins
 - cellulose, hemicellulose, pectins
 - cellulose
15. In the plant cell cytoplasm there are
- simple and bordered pits
 - no simple and bordered pits
16. In the prosenchyma cell
- length is equal to width
 - length is more than width
17. In the cytoplasm there is
- one layer of the membrane
 - two layers of the membrane
 - tree layer of the membrane
18. During the life activity of the cytoplasm
- the chemical changes take place
 - no chemical changes take place
 - the nucleus turns to the nucleolus
19. The plant cell cytoplasm is
- the compound hydrophilic colloid system
 - the compound hydrophobic colloid system
20. In the parenchymatous cell
- length is more than width
 - length is equal to width

21. The plant nucleus has
a) a compound structure
b) no structure
22. The cell juice is
a) fluid
b) solid
23. The main chemical compositions of the plant cell are
a) proteins, lipoids, nuclear acids
b) only proteins and lipoids
c) only lipoids and nuclear acids
24. The main part of the cell juice is
a) mineral salts, organic acids, solvable carbohydrate, proteins, pigments
b) only mineral salts
25. The structural part of the plant cell nucleus is
a) the two membrane wall with pits, karyoplasm, chromosomes and nucleolus
b) the one membrane wall with pits
c) chromosomes and nucleolus
26. In the cell juice there is
a) physiological active substances (ferments, hormones, vitamin) cause the normal life activity of the cell
b) physiological active substances (ferments, hormones, vitamin) cause no normal life activity of the cell
27. In the plant nucleus there is
a) colloid system with tenacious consistence
b) colloid system with hard consistence
28. The main part of the plant cell is
a) DNA polymer which monomers are nucleotides
b) RNA monomer
c) DNA monomer
29. In the nucleus the base of chromosome is DNA
a) which can divide
b) which can not divide
30. The plant nucleus
a) stimulate the cell growing
b) takes part in the metabolism
c) regulate the synthesis of ferments and conducting of the inheritable characteristics of the organism
d) stimulate the cell resting
31. The cell wall
a) is a hard part of the cell
b) doesn't protect the cell
c) protects the cell
d) doesn't turn the cell to the specific shape
32. The cell wall
a) consists of the organic compositions: cellulose, hemicellulose and pectins
b) consist of the inorganic compositions: cellulose, hemicellulose and pectins
33. In the cell juice
a) there is different chemical compound
b) the primary products of metabolism are carbohydrates
c) the primary products of metabolism are alkaloids, glycosides, pigments
d) the secondary products of metabolism are carbohydrates
34. In the cell juice

- a) the inulin is saved as a storage substance
- b) the inulin is not saved as a storage substance

35. The cell wall

- a) contains hemicellulose which can be accumulated in a large amount
- b) is used of a plant as a storage substance
- c) contains chitin

36. In the cell wall

- a) during ontogenesis of the plant it is formed compounds which increase its constance
- b) during ontogenesis of the plant it is formed no compounds which increase its constance

37. The connection among the cells is possible with the help of

- a) plasmodesms
- b) chlorophyll

38. With the help of the cell wall and plasmodesms

- a) cells put together into one organism
- b) cells live independently

39. The vacuole is

- a) the organ of self-regulation
- b) the organ of the changing of the solute substance
- c) the organ of chitin regulation

40. The pigments of anthocyan and anthochlorine

- a) change the color when the concentration of solve substances are changed
- b) don't change the color when the concentration of solve substances are changed

41. Chloroplasts have got

- a) have got protein lipoid body with pigments
- b) have not got protein lipoid body with pigments

42. Chloroplasts

- a) can be find only in plant cells
- b) can be find only in animal cells

43. Cytoplasm

- a) have got colloid structure
- b) have not got colloid structure

44. Chloroplasts

- a) have got lamella granule structure
- b) have not got lamella granule structure

45. Chloroplasts

- a) part in photosynthesis
- b) don't take part in photosynthesis

46. In the chemical structure of chloroplasts

- a) there are proteins, lipoids, pigments, mineral salts and water
- b) there are proteins, lipoids, pigments, mineral salts and water

47. The main pigments located on the surface membranes of chloroplasts

- a) aleurone grains
- b) starch
- c) chlorophyll a and b, carotin, xanthophyll

48. Mithochondria synthesize

- a) starch
- b) ATP
- c) aleurone grains

49. In chloroplasts occur
- producing the secondary starch
 - photosynthesis
 - producing ATP

50. Meiosis accompanies
- growth of the chromosome number
 - reduction of the chromosome number
 - formation of diploid cells
 - formation of haploid cells

Part 3. Exam questions.

| NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES | | | |
|--|--|---|--|
| LE Bachelor Speciality –201 “202 Plant protection and quarantine ” | Department of Botany, Dendrology and Forest Tree Breeding 2023–2024 study year | EXAMINATION TASK <u>Variant №1</u> Botany | Approved by Chief of the department _____ Y. Marchuk “ _____ ” _____ 2023 |

Examination questions

- Vegetative reproduction of plants. Ways of Vegetative reproduction of plants.**
- Family of Ranunculaceae. Botanical characteristic of the family. Meaning of the members of the family for the agriculture.**

TEST TASKS

- 1. To what tissues depends the water parenchyma?**

| | |
|---|-----------|
| 1 | Main |
| 2 | Dermal |
| 3 | Forming |
| 4 | Secretory |

- 2. Root which grows from the root is called(write the the right answer).**

- 3. What tissue of the leaf does the function of the photosynthesis**

| | |
|---|--------------|
| 1 | Aerenchyma |
| 2 | Sclerenchyma |
| 3 | Chlorenchyma |
| 4 | Epidermis |

- 4. What inflorescence depends on the cymose inflorescence?**

| | |
|---|-----------|
| 1 | bunch |
| 2 | umbrella |
| 3 | cyme |
| 4 | Dichasium |

- 5. What cells of the embryo sac are diploid?**

| | |
|---|--------------|
| 1 | Egg cell |
| 2 | Synergids |
| 3 | Central cell |
| 4 | antipodes |

- 6. What vegetative body of plant consists of additional roots, stem and fronds?**

| | |
|---|-------------|
| 1 | Mosses |
| 2 | Club-mosses |
| 3 | Horse-tail |
| 4 | Ferns |

- 7. On what family depends *Chelidonium majus* L.**

| | |
|---|-----------------|
| 1 | Ranunculaceae |
| 2 | Papaveraceae |
| 3 | Caryophyllaceae |
| 4 | Amaranthaceae |

- 8. What members of the family have the right monosexual with simple inflorescence and have five elements?**

| | |
|---|--------------|
| 1 | Brassicaceae |
| 2 | Malvaceae |
| 3 | Cannabaceae |
| 4 | Fabaceae |

- 9. On what family depends *Melilotus officinalis* (L.) Pall.**

| | |
|---|------------------|
| 1 | Crassulaceae |
| 2 | Rosaceae |
| 3 | Onagraceae |
| 4 | Fabaceae |
| 10. What plants from what family have tubular flowers with such formula $C_5C_0(5)A(5)G(2)$ | |
| 1 | Scrophulariaceae |
| 2 | Plantaginaceae |
| 3 | Lamiaceae |
| 4 | Asteraceae |
| Developer, PhD A.P. Tertyshnyy | |

7. Teaching methods

Word methods, practical methods, experimental methods

8. Forms of assessment

previous, current, module, final.

Progress of the student is determined his knowledge which are demonstrated in the test form during the current and final control and also skills which are the result of the systematic work with objects on the laboratory works and the right fulfilling biological picture. To allow to take the examinations the students are without the missed laboratory works.

The students who miss more than 50% of the laboratory works without reasonable excuses in the semester to working off of the missed lessons do not allow.

9. Distribution of the marks which are received by students.

Evaluation of student knowledge is carried out on a 100-point scale and is converted to national grades according to Table 1 "Regulations and Examinations and Credits at NULES of Ukraine" (order of implementation dated 26.04.2023, protocol No. 10)

| Student rating, points | National grade based on exam results | |
|------------------------|--------------------------------------|------------|
| | exams | credits |
| 90-100 | excellent | passed |
| 74-89 | good | |
| 60-73 | satisfactory | |
| 0-59 | unsatisfactory | not passed |

In order to determine the rating of a student (listener) in the discipline R_{dis} (up to 100 points), the rating from the exam R_{ex} (up to 30 points) is added to the rating of a student's academic work R_{aw} (up to 70 points): $R_{dis} = R_{aw} + R_{ex}$

10. Educational and methodological support.

Syllabus (work program of credit modules);

Textbooks in accordance with the syllabus of the academic discipline;

Study guides for various types of work in the discipline: laboratory work, lectures, educational practice;

Educational content – didactic and demonstration materials for educational classes (tasks for practical classes, multimedia presentations, posters, layouts, models, handbooks, albums, diagrams, video and audio recordings, etc., intended to support the educational process);

Photos and schematic images of higher plants using presentations and Internet resources.

Tertyshnyi A.P. Botany. Current system of flowering plants. Part I. Methods handbook for students of the educational degree "Bachelor" of the specialty 202 "Plant protection and quarantine". Kyiv: Lira-K, 2022. 182 p.

Tertyshnyi A.P. Botany. Part 1: tutorial. Kyiv: Lira-K, 2020, 250 p.

11. Recommended sources of information

-basic

- Berg L.R. Introductory botany: Plants, people, and the environment. 2nd edition, Thompson Brooks/Cole, 2008.
- Simpson M. G. Plant Systematics. 3rd Edition, Academic Press, 2019.
- Singh G. Plant Systematics: An integrated approach. 3rd edition, Enfield, N.H.: Science Publishers, 2010.
- Tertyshnyi A.P. Botany. Current system of flowering plants. Part I. Methods handbook for students of the educational degree "Bachelor" of the specialty 202 "Plant protection and quarantine". Kyiv: Lira-K, 2022. 182 p.
- Tertyshnyi A.P. Botany. Part 1: tutorial. Kyiv: Lira-K, 2020, 250 p.
- Тертишний А.П. Ботаніка. Квіткові рослини Лісостепу України. Частина 1: навчально-методичний посібник для студентів освітнього ступеня "Бакалавр" спеціальності 202 "Захист і карантин рослин". Київ: Видавництво Ліра-К, 2022. 165 с.

7. Тертишний А.П. Покритонасінні рослини Лісостепу України. Частина 1: Навчальний посібник. Київ: Видавництво Ліра-К, 2021. 706 с.
8. Тертишний А.П. Покритонасінні рослини Лісостепу України. Частина 2: Навчальний посібник. Київ: Видавництво Ліра-К, 2022. 312 с.
9. Якубенко Б.Є. Алейніков І.М., Шабарова С.І., Машковська С.П. Ботаніка. Підручник (перевидання). Київ, Видавництво Ліра-К, 2021, 436 с.
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2. Catalogue of life <https://www.catalogueoflife.org>
3. Eurasian Dry Grassland Group <https://edgg.org/>
4. European Vegetation Archive (EVA) <http://euroveg.org/eva-database>
5. European Vegetation Survey <http://euroveg.org/>
6. Global Biodiversity Information Facility (GBIF) <https://www.gbif.org>
7. Global Index of Vegetation-Plot Databases (GIVD) <http://www.givd.info/>
8. National Biodiversity Information Network <http://ukrbn.com>
9. National Vegetation Classification (NVC) <https://incc.gov.uk/our-work/nvc/>
10. Open data about biodiversity <https://www.inaturalist.org>
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12. The Gymnosperm Database <https://www.conifers.org/index.php>
13. The International Association for Vegetation Science (IAVS) <http://iavs.org/>
14. The WFO <http://www.worldfloraonline.org/>
15. U.S. National Plant Germplasm System <https://npgsweb.ars-grin.gov/>
16. Ukrainian geobotanical site <http://geobot.org.ua/>



COURSE SYLLABUS “BOTANY”

Degree of higher education – Bachelor
Specialization – 202 Plant protection and quarantine
Educational programme – 20 Agrarian sciences and food
Academic year – 1, **semester** – 1
Form of study – full-time
Number of ECTS credits – 4
Language of instruction – English

Lecturer of the course Anatolii P. Tertyshnyi, Phd in Biology, Associate Professor, Department of Botany, Dendrology and Forest Tree Breeding,

Contact information of the lecturer (e-mail) 03041, Ukraine, Kyiv, str. Henerala Rodimtseva 2, the First Educational Building 1a (Botanical garden NUBiP of Ukraine), +38(044) 527-85-18, e-mail: tertyshnyy@ukr.net

Course page on eLearn

<https://elearn.nubip.edu.ua/enrol/index.php?id=1085>

COURSE DESCRIPTION

The study of educational materials of the discipline “Botany” helps future bachelors of speciality 202 Plant protection and quarantine to obtain the appropriate level of theoretical knowledge, formation and development of special skills, practical skills using the laws of development of plants as major components of biosphere.

Competencies of the educational programme:

Integrative competency (IC): Ability to solve complex specialized problems and practical problems of professional activity with protection and quarantine of plants and apply theoretical knowledge and methods of phytosanitary monitoring, review, analysis, expertise, which are characterized complexity and uncertainty of conditions.

General competencies (GC):

GC 2. Ability to apply knowledge in practical situations

GC 3. Knowledge and understanding of the subject area and understanding of professional activity.

Professional (special) competencies (PC): –

Program learning outcomes (PLO) of the educational programme:

PLO 4. Have knowledge of higher mathematics, biophysics, chemistry (analytical, organic, inorganic, physical and colloid), botany and agrozoology to the extent necessary for understanding the processes of the specialty protection and plant quarantine.

COURSE STRUCTURE

| Topic | Hours (lecture/practical) | Learning outcomes | Tasks | Assessment |
|--|------------------------------|--|---|------------|
| Semester 1 | | | | |
| Module 1 | | | | |
| Topic 1. Introduction to Botany. | 0,5/1 | Know terms, systematic and main groups of plants; Be able to 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 | Submitting practical work. Taking tests | 2 |
| Topic 2. Plant cell | 0,5/1 | | | 2 |
| Topic 3. Plant tissues. | 0,5/1 | | | 2 |
| Topic 4. Vegetative organs of plants. | 0,5/1 | | | 2 |
| Topic 5. Propagation of plants. | 1/2 | | | 2 |
| Topic 6. Genarative organs of angiosperm | 1/2 | | | 4 |
| Topic 7. Introduction to plant systematic. LUCA, Bacteria, Arkarya. Amorphea: Fungi. Archaeplastida: Glaucophyta, | 1/2 | | | 2 |

| | | | | |
|--|-------|--|--|------------|
| Rhodophyta, Viridiplantae. | | development, phylogenic relations and value for agriculture and plant protection. | | |
| Topic 8. Marschantiophyta, Bryophyta, Anthocerotophyta, Lycophyta Euphyllophyta, Monilophyta, Spermatophyta: Gymnospermatophyta. Structure, life cycles, biology. | 1/2 | | | 4 |
| Module 2 | | | | |
| Topic 9. Angiosperm plants. (Magnoliophyta, APG IV): ANA GRADE, MAGNOLIIDS, MONOCOTS, EUDICOTS, SUPERROSIDS. | 6/12 | Know terms, systematic and main groups of plants; Be able to 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 and plant protection. | Submitting practical work. Taking tests | 20 |
| Module 3 | | | | |
| Topic 10. SUPERASTERIDS, ASTERIDS | 2/4 | Know terms, systematic and main groups of plants; Be able to 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 and plant protection. | Submitting practical work. Taking tests | 20 |
| Topic 11. Phytogeography. Flora. Areal of plants. Main ecological factors and its influence on plants. | 0,5/1 | | | 5 |
| Topic 12. Phytocoenology. Vegetation. Types of vegetation. Systematic of phytocenosis. | 0,5/1 | | | 5 |
| Total for 1 semester | | | | 70 |
| Exam | | | | 30 |
| Total for course | | | | 100 |

ASSESSMENT POLICY

| | |
|---|--|
| Policy regarding deadlines and resits: | Assignments submitted after the deadline without valid reasons will be graded lower. Resitting of modules will be allowed with the permission from the lecturer and in the presence of valid reasons (e.g. medical reasons). |
| Academic honesty policy: | Cheating during tests and exams is strictly prohibited (including the use of mobile devices). Coursework and research papers must contain correct citations for all sources used. |
| Attendance policy: | Class attendance is mandatory. In case of objective reasons (such as illness or international internships), individual learning may be allowed (in online format by the approval of the dean of the faculty). |

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

| Student rating, points | National grade based on exam results | |
|------------------------|--------------------------------------|------------|
| | exams | credits |
| 90-100 | excellent | passed |
| 74-89 | good | |
| 60-73 | satisfactory | |
| 0-59 | unsatisfactory | not passed |

RECOMMENDED SOURCES OF INFORMATION

1. Berg L.R. Introductory botany: Plants, people, and the environment. 2nd edition, Thompson Brooks/Cole, 2008.
2. Simpson M. G. Plant Systematics. 3rd Edition, Academic Press, 2019.
3. Singh G. Plant Systematics: An integrated approach. 3rd edition, Enfield, N.H.: Science Publishers, 2010.
4. Tertyshnyi A.P. Botany. Current system of flowering plants. Part I. Methods handbook for students of the educational degree “Bachelor” of the specialty 202 “Plant protection and quarantine”. Kyiv: Lira-K, 2022. 182 p.
5. Тertyshnyi A.P. Ботаніка. Квіткові рослини Лісостепу України. Частина 1: навчально-методичний посібник для студентів освітнього ступеня “Бакалавр” спеціальності 202 “Захист і карантин рослин”. Київ: Видавництво Ліра-К, 2022. 165 с.
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2. Catalogue of life <https://www.catalogueoflife.org>
3. Eurasian Dry Grassland Group <https://edgg.org/>
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7. Global Index of Vegetation-Plot Databases (GIVD) <http://www.givd.info/>
8. National Biodiversity Information Network <http://ukrbin.com>
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