

**1. Name: Virusology**

**2. Lecturer:** associate professor, Dr. Shamrai S.M.

**3. Status:** normative for specialities of biological faculty

**4. Year of education 2, semester 4**

**5. Credits – 2,5. Total number of academic hours - 48,** including 32 lectures, 16 seminars.

**6. Previous conditions for studying:** general biology knowledge.

**7. Brief summary** The purpose of teaching this academic subject is to develop students' fundamental knowledge on the structure, mechanisms of replication, taxonomy, evolution and practical value of viruses, viroids and prions, measures and means to combat diseases caused by them.

Main objectives of discipline studying is learning the modern idea of viruses, viroids and prions place and role in nature; familiarization with the structure, morphology and replication characteristics of viruses and viroids; features of the viruses, viroids and prions and their hosts interrelationships; main viral human, animal, plant and prokaryotic diseases; mechanisms of host resistance to viral infection and basics of antiviral therapy; genetics theories of viruses origin and evolution; main methods of viruses research.

On the course completion students should know the structure and composition of viruses, viroids and prions; modern principles of viruses classification; replication features of various groups of viruses, viroids and prions; main viral human, animal, plant diseases; theory of viruses; the possible role of viruses in evolution; effects of viruses, viroids and prions interaction with living organisms at different levels; main principles of antiviral therapy. After attending the course, students should be able to recognize the symptoms of probable viral diseases; use modern special terminology; apply this knowledge to further training and practice. Course is divided onto following topics:

1. The history of virology. Nature of viruses, viroids and prions. Morphology, classification and replication of viruses and viroids.

2. Main diseases caused by viruses. Antiviral immunity and antiviral therapy.

3. The origin, genetics, and evolution of viruses. Main methods of viruses research and identification.

**8. Form of knowledge organization, evaluation system:** Evaluation of students work in seminars, tests, course paper, final written test.

**9. Teaching and methodological support:** CD with scientific and educational literature, software and multimedia presentations, Internet resources.

**10. Teaching language:** Ukrainian, Russian.

**1.Name: Soil Science**

**2.Lecturer:** associate professor, Dr. Usichenko A.S.

**3.Status:** normative for specialities of biological faculty

**4.Year of education 2, semester 3**

**5.Credits – 2. Total number of academic hours - 36, including 18 lectures, 18 laboratory hours.**

**6.Previous conditions for studying:** general biology knowledge.

**7.Brief summary**The course provides students with knowledge about soil as multi-component open system and familiarization with processes of soil formation. The course deals with interrelationships of soil and other components of the environment, reasons for diversity of soils and general patterns of their geographical distribution. Objectives of the course also include study of soil composition, properties and modes, principles of their classification, nomenclature and zonal distribution.

On the course completion students should know basic soil formation processes and the role of living organisms in soil genesis, soil structural elements and properties, main soil types and their distribution in Ukraine, principles of their protection.

During laboratory classes students gain practical skills of describing different types of soil profiles, identifying its structure and grain-size distribution; acidity and quality of water-soluble salts of soil; isolation of microorganisms using dilution method, determination of the qualitative and quantitative composition of microbiota. Course is divided onto following topics:

1. Soil-frmng process and formation of soil profile.
2. Soil and its properties.
3. Main types of soil.
4. Protection of soil.

**8. Form of knowledge organization, evaluation system:** written tests, written examination work.

**9. Teaching and methodological support:** scientific literature, map of soils of Ukraine soil samples. Guidelines for laboratory studies.

**10.Teaching language:** Ukrainian, Russian.

**1.Name: The basics of plant immunity (section Plant immunology)**

**2.Lecturer:** associate professor, Dr. Akulov O.Yu.

**3.Status:** normative for specialities of biological faculty

**4.Year of education 3, semester 6**

**5.Credits – 1. Total number of academic hours - 10, including 8 lectures, 2 seminars.**

**6.Previous conditions for studying:** general biology knowledge.

**7. Brief summary**The course discusses the general plant immunity. The main aim of the course is to familiarize students with current data about the variety of constitutive and active defense mechanisms in plants, and characteristics of pathogenic fungi, bacteria, viruses and pests that enable them to overcome plant protective barriers.

The course is considered to variety of plant diseases and their causes, basic concepts and definitions of plant immunity (immunity, stability, sensitivity, tolerance), and features of plant resistance formation in comparison to animals. Features of pathological processes caused by phytopathogenic viruses, bacteria, fungi and fungi-like protists, parasitism strategies, types of pathogens specialization and stages of plants colonizing are described.

To illustrate passive plant immunity, anatomical and morphological characteristics, ontogenesis regulation and repair damage, nutritional value of plant tissues and constitutional antimicrobial chemical compounds – phytoanticipins are studied. Postinfectious plant toxins – phytoalexins and their role in plant resistance to diseases and pests, hypersensitivity reaction (HR, programmed cell death, apoptosis) as the main mechanism for specific plant resistance to diseases realization and acquired systemic plant resistance (SAR) are studied within the active protective reactions of plants. Recognition specificity of hostile organisms by plants and ways of plant pathogen recognition are discussed.

Examples of active protective reactions of plants include oxidative flash, cell membrane strengthening, transcription reprogramming, synthesis of PR-proteins and other defense-related proteins, signaling pathways dependent on salicylic acid and jasmonic acid, ethylene and NO.

Particular attention is paid to genetic aspects of plant immunity, consideration of parasite-host interactions under the "gene-to-gene" principle, plant resistance genes, parasite avirulence genes and their encoded proteins. The immunity induced by molecular structures associated with microorganisms (MAMPs) and the immunity, induced by pathogen effectors and their receptors, signaling pathways that are triggered by stability proteins, coordination of hypersensitive cell death and contrast mechanisms of resistance to biotrophic and necrotrophic parasites.

After the "Plant immunology"course adoption, students ought to know how to establish a logical connection between ecological and trophic pathogen groups, utilized parasitism strategy and possible ways of its recognition and neutralization by plant, and to characterize various types of plant protective reactions using common terminology.

**8. Form of knowledge organization, evaluation system:** final examination.

**9. Teaching and methodological support:** Complex of teaching and methodical support of discipline (a set of multimedia presentations, educational videos, Internet resources, CD with the course program, scientific and educational literature, lecture notes). All necessary training materials are also presented in closed thematic groups in social networks.

**10.Teaching language:** Ukrainian

**1.Name: Applied mycology**

**2.Lecturer:** associate professor, Dr. Akulov O.Yu.

**3.Status:** normative for specialities of biological faculty

**4.Year of education 4, semester 7**

**5.Credits – 2. Total number of academic hours - 36, including 30 lectures, 6 seminars.**

**6.Previous conditions for studying:** general biology knowledge, botany, biotechnology, biochemistry

**7. Brief summary**The purpose of teaching is deepening and structuring students' knowledge of the functional role of fungi in nature and their impact on various aspects of human life, as well as opportunities and prospects for their practical use. The course can be divided onto following sections: practical aspects of interaction between fungi, humans and animals, practical aspects of interaction between fungi and plants, fungi as model objects in biology and use of fungi in biotechnology.

Teaching covers the role of fungi in human history and theoretical foundations of ethnomycology. Students become acquainted with theoretical basics of medical and veterinary mycology, namely classification of fungal diseases of humans and domestic animals, biological features of infectious agents, main symptoms of fungal infections and its diagnostics in humans and modern antifungal drugs - antimycotics, their diversity and application features.

The course is focused on the human or animal poisoning by fungal toxins (mycotoxicoses and mycetism). In particular, it reviews key functional groups of mycotoxins and their producers, and modern methods for determination of mycotoxins in food products. Toxigenic macromycetes particularly dangerous to humans and techniques of their identification are studied, basic toxins of macroscopic fungi and mechanisms of their action, symptoms of mushroom poisoning and providing first aid measures for different types of diseases. Students also are provided with current information about hallucinogenic substances found in mushrooms and mechanisms of their action. Special attention is paid to the diversity of natural symbioses of fungi and animals, including symbiosis of Neocallimastigomycota fungi and ruminants, mutualistic relationships of fungi and termites, bark beetles, leaf beetles, ants, etc., and predacious fungi. Practical use of zoopathogenic and predacious fungi are studied.

Similarly, applied aspects of fungus-plant interactions are studied, including diversity of pathogenic fungi and diseases caused by them. This section deals with modern fungicides and mechanisms of their action and biological drugs for plant protection from diseases and their application features. Lichens, their functional role in the biosphere and practical use are discussed. Students have the opportunity to get acquainted with mycorrhiza and its role in nature and human life.

During the classes, students gain knowledge of classical and modern methods of fungi application in biotechnology and theoretical foundations of mushroom growing, as well as biodestructor fungi. The courses ends with using of fungi as biological research models (in biochemistry, molecular biology, genetics, physiology, radiobiology, ecology, etc.) and fundamental scientific discoveries that have been made using fungi.

**8. Form of knowledge organization, evaluation system:** Current control - thematic written tests, individual extracurricular test. Final control - written test.

**9. Teaching and methodological support:** a set of multimedia presentations, educational videos, Internet resources, CD with the course program, scientific and educational literature. All necessary training materials are also presented in closed thematic groups in social networks.

**10.Teaching language:** Ukrainian

**ANNOTATIONS OF SPECIAL DISCIPLINES FOR BACHELORS  
DEPARTMENT OF MYCOLOGY AND PLANT RESISTANCE**

**1.Name: Subject and methods of investigation in mycology and plant pathology**

**2.Lecturer:** associate professor, Dr. Akulov O.Yu.

**3.Status:** optional

**4.Year of education 3, semester 6**

**5.Credits – 2. Total number of academic hours - 32, including 20 lectures, 12 practicals.**

**6.Previous conditions for studying:** general biology knowledge

**7. Short annotation:**

The purpose of course is the assimilation of elementary laboratory and field research methods of mycological and phytopathological subjects and introduce students to the department and the main directions of its work. The course provides thematic modules: collection and description of mycological and phytopathological samples, illustrating and identification of fungi, herbarium collection management. Besides that, students ought to get information about major world mycological and phytopathological centers and main sources of mycological and phytopathological scientific information.

The special course helps students to get skills of phytopathological and mycological material sampling, the rules of samples fixing, making temporary mounts and microscoping, making scientific drawings and photographs, using identification guides, basic skills of herbarium management, working with mycological and phytopathological databases. In the future, these knowledge and skills are significantly supplemented and developed during the on-site practice.

**8. Form of knowledge organization, evaluation system:** control examination, final written test.

**9. Teaching and methodological support:** a set of multimedia presentations, Internet resources, CD with the course program, scientific and educational literature, specimens of scientific herbarium, identification guides.

**10.Teaching language:** Ukrainian

**1.Name: General and agricultural plant pathology**

**2.Lecturer:** associate professor, Dr. Akulov O.Yu.

**3.Status:** optional

**4.Year of education 4, semester 7**

**5.Credits – 2. Total number of academic hours - 36, including 36 lectures.**

**6.Previous conditions for studying:** general biology knowledge, botany, plant immunology, cytology.

**7. Brief summary**The purpose of teaching is to develop modern ideas about plant diseases and to learn the most common and harmful crop diseases in Ukraine. Features of pathological process in the case of necrotrophic, biotrophic and hemibiotrophic parasitism, morphological, anatomical and ultrastructural changes that occur in diseased plants, the impact of various environmental factors and farming practices on plant destruction and development of diseases are studied.

Students get information about the diversity of pathogens and parasitic strategies in nature, diversity and diagnostic features of most common crop diseases in Ukraine and biological characteristics of pathogens.

On completion of the course students are expected to identify the source of infection renovation and basic factors of harmfulness using the information about species identity and characteristics of the pathogen life cycle, to make informed decisions about effective methods of controlling the disease caused by it.

**8. Form of knowledge organization, evaluation system:** review of previous material at the beginning of each lecture, current tests, final examination.

**9. Teaching and methodological support:** a set of multimedia presentations, Internet resources,

CD with the course program, scientific and educational literature, specimens of training phytopathological herbarium, identification guides.

**10. Teaching language:** Ukrainian

**1. Name: Plant protection**

**2. Lecturer:** associate professor, Dr. Usichenko A.S.

**3. Status:** optional

**4. Year of education 4, semester 7**

**5. Credits – 2. Total number of academic hours - 36, including 36 lectures.**

**6. Previous conditions for studying:** general courses 'Biochemistry', 'Plant physiology', special courses 'General and agricultural plant pathology'.

**7. Short annotation:**

The course is regarded to the methods and techniques of the integrated plant protection; basic principles of prevention of pathogen invasion and organization of pathogen direct elimination.

Modern information about current classification and action mechanism of drugs used in plant protection is provided during the course. The course involves acquiring a theoretical ground of planning and implementation of plant protection measures. On completion of the course students ought to have basic knowledge about the modern activities of prevention of pathogen invasion and methods of plant protection, information about the main types of pesticides. Lecturing is divided onto the following topics:

1. Organization of plant protection. Prevention of pathogen invasion
2. Methods of direct plant protection. Drugs used in plant protection.
3. Integrated plant protection.

**8. Form of knowledge organization, evaluation system:** written tests, final examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, lecture notes and multimedia presentations.

**10. Teaching language:** Ukrainian, Russian

**1. Name: General mycology**

**2. Lecturer:** associate professor, Dr. Usichenko A.S.

**3. Status:** optional

**4. Year of education 4, semester 7**

**5. Credits – 4. Total number of academic hours - 54, including 30 lectures, 12 seminars, 12 practicals.**

**6. Previous conditions for studying:** general biology knowledge

**7. Brief summary**

The course is designed to give students basic knowledge of morphology, cytology, plectology, biology, physiology and genetics of fungi and the principles of their classification. The course objectives are: to familiarize students with current information on morphology, cytology, plectology, biology, physiology and genetics of fungi, their diversity and role in nature; to cover the main stages of mycological science; to provide current information about the place of fungi in the organic world; to form practical skills needed for fungal subjects.

On completion of the course students are expected to know the basic features of fungal life forms; place of fungi in the organic world and principles of their classification; taxonomic and ecological-trophic diversity of fungi and their role in nature; basic stages of mycological science; thallus types and its modifications; cytological, physiological and biochemical characteristics of fungal megataxons; diversity of genetic recombination and life cycles in fungi; modern requirements for describing and naming of fungi. During the practicals students acquire skills of diagnostics of different taxonomic, ecological and trophic groups of fungi in

nature; abilities to characterize the types of thallus and its modifications; make temporary mounts for microscopy of different vegetative and reproductive fungal structures.

1. Fungi as the subject of nature. History of mycological science.
2. Cytology, morphology and plectology of fungi.
3. Physiological, genetic and biological features of fungi.
4. The diversity of fungi in nature and principles of their classification.

**8. Form of knowledge organization, evaluation system:** written tests, final examination.

**9. Teaching and methodological support:** scientific literature, herbarium specimens, multimedia presentations, laboratory equipment.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Molecular bases of plant immunity**

**2. Lecturer:** associate professor, Dr. Shamrai S.M.

**3. Status:** optional

**4. Year of education 4, semester 7**

**5. Credits – 2. Total number of academic hours - 36, including 36 lectures**

**6. Previous conditions for studying:** ‘General mycology’, ‘Fundamental biochemistry’, ‘Fundamental immunology’

**7. Brief summary**

The course "Molecular bases of plant immunity" is aimed to develop students' comprehensive idea of the fundamental ideas of modern plant immunology. Students ought to get general information of molecular mechanisms of interaction between plants and their parasites; genetic and molecular basics of plant resistance; using of modern scientific achievements in the field of plant biotechnology, including modern methods of designing plant varieties and hybrids resistant to adverse environmental factors.

On completion of the course, students ought to know the pathogenicity and virulence factors of pathogenic viruses, bacteria and fungi; forms and mechanisms of plant immunity. The course is divided onto following topics:

1. Features of pathogenic organisms.
2. Mechanisms of plant resistance.

**8. Form of knowledge organization, evaluation system:** evaluation of written control examination, tests after the topic 2, final written examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, lecture notes and multimedia presentations.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Methods of field research**

**2. Lecturer:** associate professor, Dr. Usichenko A.S.

**3. Status:** optional

**4. Year of education 4, semester 8**

**5. Credits – 2. Total number of academic hours - 32, including 16 lectures, 16 seminars**

**6. Previous conditions for studying:** special courses ‘General mycology’, ‘Agricultural mycology’

**7. Brief summary**

The course includes learning the basic elements of the methods and techniques of field experiments, phytopathological methods of field research, counts and estimation, working out practical skills in research planning, effectiveness of plant protection measures, calculation of phytopathological indexes which show the condition of crops. The objectives of the course are: acquiring the theoretical basis and practical skills of planning and implementation of field experiments.

On completion of the course students get knowledge about the types of field experiments,

general planning, organization and conducting of field experiments, fundamental elements of field experiment methods and techniques, phytopathological methods of field research, counts and estimation.

Students are expected to acquire skills enabling to plan scientific research, develop a plan of experiment, to keep research documentation and calculate parameters of phytopathological condition of crops - the incidence and extent of disease and the expected crop losses, to evaluate biological, economic and financial effectiveness of plant protection measures. Course is divided onto following topics:

1. Organization of field experiment.

2. Phytopathological methods of counting pathogens and diseases.

**8. Form of knowledge organization, evaluation system:** written tests, final examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, lecture notes and multimedia presentations.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Systematics of fungi**

**2. Lecturer:** associate professor, Dr. Akulov O. Yu.

**3. Status:** optional

**4. Year of education 4, semester 8**

**5. Credits – 4. Total number of academic hours - 64, including 30 lectures, 24 practicals and 10 seminars.**

**6. Previous conditions for studying:** botany, general mycology, general and agricultural plant pathology.

**7. Brief summary** The purpose of the course is to familiarize students with a variety of fungi and fungi-like protists in nature and principles of their classification. Students consider the taxonomic and ecological diversity of fungi, their diagnostic features and principles of classification. Practical develop the practical skills of studying different taxa of fungi.

During the course students learn the modern system of fungi and fungi-like protists (to the order level), current views on the phylogeny of fungi, ecological and trophic diversity of fungi and their role in nature and human life, diagnostic features of different fungal taxa, name and systematic position of studied taxa typical representatives, as well as specific methods used in the taxonomy of fungal taxons.

**8. Form of knowledge organization, evaluation system:** current control – control examinations, seminar and practical tasks, final examination.

**9. Teaching and methodological support:** a set of multimedia presentations, Internet resources, CD with the course program, scientific and educational literature, specimens of training mycological herbarium.

**10. Teaching language:** Ukrainian

**1. Name: Genetics of Fungi.**

**2. Lector:** Doctor of Science, Teaching assistant Shkorbatov Yu.G.

**3. Status:** selective.

**4. Year of study: 4; semester: 8.**

**5. Credits: 2; hours of lecturing: total - 32, including 28 lectures, 4 seminars.**

**6. Previous conditions for studying:** basic knowledge of general biology, organic and inorganic chemistry.

**7. Short abstract:** Aim of the course - to acquaint students with the basics of genetics fungi that are specific and volumetric section of modern genetics. Objectives: To acquaint students with the general principles of the structural organization of the fungi genetic apparatus; elucidate the features of mutagenesis and DNA recombination in fungi; show the bases of genetics sexual cycle in fungi; show the bases of genetics of aging in fungi; introduce the genetics of

pathogenicity of pathogenic fungi; show main methods of selection and genetics of fungi that are the objects of biotechnology; introduce to molecular techniques in taxonomy and phylogeny of fungi.

On completion of the course students should know: the principles of structural organization of the genetic apparatus mushrooms; features mutagenesis and DNA recombination in fungi; foundations of genetics sexual cycle mushrooms; basics of genetics of aging and mushrooms; basics of genetics of pathogenicity of pathogenic fungi and fungal pathogens; genetics and breeding bases fungi that are the objects of biotechnology; foundations using genetic techniques in taxonomy and phylogeny of fungi.a

Students will be able to use current data of genetics to solve scientific problems of mycology; to apply the knowledge of the genetics of fungi to biotechnology; to apply the fungi genetics knowledge to solve problems of Phytopathology.

**8. Form of knowledge organization, evaluation system:** Current control is writing essays, surveys, assessment of work at the seminars. Form of Modular control is the checking tests. Students take credit for completion of the course.

**9. Teaching and methodological support:** educational literature, computer presentations.

**10. Language of teaching:** Ukrainian.

**1.Name: Forest plant pathology**

**2.Lecturer:** associate professor, Dr. Usichenko A.S.

**3.Status:** optional

**4.Year of education 4, semester 8**

**5.Credits – 3. Total number of academic hours - 48, including 30 lectures, 18 practicals**

**6.Previous conditions for studying:** special courses ‘General mycology’, ‘Systematics of fungi’.

**7. Brief summary**

The course is aimed to studying basic pathologies of tree vegetation; provides elaboration of practical skills on diagnostics and identification of forest plantations pathogens. Course objectives are: to acquire a theoretical principles and practical skills for identification of tree plant pathologies, planning and implementation of forest protection surveys, to get methodological aspects of the forest protection activities organization.

On completion of the course students get knowledge about the types of forest diseases; diagnostic features and characteristics of major pathogens development; features of pathological processes in wood in buildings and during its storage; forest protection activities organization; modern methods of forest protection from diseases.

During the course students gain the ability to identify pathogens of tree vegetation; to provide diagnosis the "dry-rot fungi", which are agents of biodegradation of wood in buildings. Teaching is divided onto the following topics:

1. Diseases of seeds, sprouts, seedlings and leaves (needles) of tree plants.
2. Diseases of branches, trunks and roots of tree plants.
3. Affection of wood in buildings and during storage.

**8. Form of knowledge organization, evaluation system:** written tests, final examination.

**9. Teaching and methodological support:** scientific literature, herbarium specimens of fungi, multimedia presentations, laboratory equipment.

**10.Teaching language:** Ukrainian, Russian

**1.Name: Plant Quarantine**

**2.Lecures:** Teaching assistant , Prylutskyi O.V.

**3.Status:** optional.

**4.Year of education 4, semester 8**

**5.Credits – 1, Total number of academic hours – 36, including 14 lectures, 12 seminars, 10 practicals.**

**6.Previous conditions for studying:** courses „General and agricultural Plant Pathology”,

„Forest Pathology”.

**7. Brief summary:** The course provides students with the basic knowledge in the diversity of quarantine objects, the practice of quarantine treatment, and the disclosure of social and practical significance of important human diseases of crops and their products. The main objectives of this course is to acquaint students with the social value of diseases of crops and international cooperation in this area, to examine the legislative framework in the field of plant quarantine, to study law basis of plant quarantine practice, to show the quarantine diseases and methods of mycological and phytopathological identification of quarantine objects.

On the course completion students should know the law regulations on plant quarantine; quarantine diseases of crops, the area of its distribution and harmfulness; the biological features of pathogens; the mycological and phytopathological examination methods for plant material and product processing. Students should be able to use the legal framework and regulations on plant quarantine; quarantine diagnose diseases and identify pathogens, prepare the necessary material for phyto sanitary control; could be use of mycological methods and phytopathological control of plant material.

Course is divided onto following topics:

1. Biological principles of successful invasive species;
2. Legislation and administration of pest control;
3. The organisms - plant quarantine objects in Ukraine.

**8. Form of knowledge organization, evaluation system:** Evaluation of students work in seminars and practicals, written test. Final control - written test.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, quarantine laws and plant quarantine software.

**10. Teaching language:** Ukrainian.

**1. Name: Methods of experimental mycology**

**2. Lecturer:** lecturer Nedilko O.P.

**3. Status:** optional

**4. Year of education 4, semester 7**

**5. Credits – 5. Total number of academic hours - 108, including 108 laboratory hours**

**6. Previous conditions for studying:** special course ‘**Subject and methods of investigation in mycology and plant pathology**’, on-site practice.

**7. Brief summary**

The course is aimed to give students the basic knowledge and skills in the field of independent experimental work with fungal objects. The main task of this special practice is to acquaint students with the principles of experimental work in mycology and create a holistic view of the variety of methods used during the mycological research. During the special practice students get acquainted with the methods of fungi isolation to pure culture from different substrates; basic methods of mycelial growing; qualitative and quantitative determination of substances produced by mycelium; interaction of mycelia.

On completion of the course students are expected to know the basics and main features of experimental work, purpose and rules of equipment operations, classification and principles of preparation culture media used in the experimental mycological work. Students ought to be able to independently adopt optimal methods for experimental problem solution; isolate fungi from various types of substrates to the pure culture; prepare main types of culture media for the fungi cultivation; perform basic laboratory operations with fungal cultures; properly log the data and apply known methods of statistical analysis to process the results obtained.

The discipline is divided onto following sections:

1. Teoretical principles of experimental mycology
2. Sterilization methods used in mycology
3. Nutrient media for fungal cultivation
4. Isolation of fungi into pure culture
5. Fungi growing in culture

6. Biochemical characteristics of fungi
7. Analysis of mycological experiment results.

**8. Form of knowledge organization, evaluation system:** control for keeping a laboratory journal, report on the individual scientific and research tasks, theoretical control test, final written test.

**9. Teaching and methodological support:** scientific literature, multimedia presentations, laboratory equipment and reagents.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Diagnostic of plant diseases**

**2. Lecturer:** Teaching assistant, Yatsuk I.I.

**3. Status:** optional

**4. Year of education 4, semester 7**

**5. Credits – 3. Total number of academic hours - 108, including 72 practicals.**

**6. Previous conditions for studying:** courses 'General mycology', 'Systematics of Fungi'

**7. Brief summary** Course is aimed to provide students with practical skills of diagnosis of crop pathogens. Objectives: to study the diversity and morphological manifestations of plant diseases; explore the diagnostic features of most common and dangerous crop pathogens; learn the methods used for the diagnosis of plant diseases; to form practical skills of identifying pathogens of different nature.

On completion of the course students acquire knowledge of the major groups of crop pathogens and their diagnostic features; morphological and physiological groups of plant diseases; most common and dangerous crop pathogens and diseases caused by them; environmental and substrate specialization of different plant pathogen species; specific methods used in working with pathogens of different nature.

The course includes acquiring skills of recognizing infectious plant diseases by complex of diagnostic signs; selection of adequate methods for the study of the causes of a plant disease; determining the most common and dangerous crop pathogens.

The course provides studying:

1. Diseases of cereal.
2. Diseases of legumes.
3. Diseases of oil, шпук and industrial crops.
4. Diseases of vegetables and melons.
5. Diseases of berries and grapes.
6. Diseases of horticultural crops.

**8. Form of knowledge organization, evaluation system:** Self-control. Current control – viva examination, carried out before and during practical work; control of notes and drawings made by students. Final control is a written test.

**9. Teaching and methodological support:** Internet resources on plant pathology, CD with the course program, scientific and educational literature, scientific and methodological videos.

**10. Teaching language:** Ukrainian

**1. Name: Methods of plant pathological studies of fungi**

**2. Lecturer:** associate professor, Dr. Usichenko A.S.

**3. Status:** optional

**4. Year of education 4, semester 8**

**5. Credits – 6. Total number of academic hours - 112, including 112 practicals**

**6. Previous conditions for studying:** special courses 'General mycology', 'General and agricultural plant pathology'

**7. Brief summary**

The course aims to practical training of research methods used in plant pathology, develop practical skills in isolation of pathogenic inoculum, identification of pathogens in culture, artificial plant inoculation, exploring the pathogen-host plant relationships. The objectives of the course are: acquiring practical skills of evaluation germinating capacity, germinating energy of different agricultural crops; isolation and identification of fungi from different plants; artificial plant infection; analysis parasitic populations using differential sets of lines and varieties.

1. Methods of experimental phytopathology.
2. Methods of relations between parasite and host plant.
3. Molecular methods in plant pathology.

**8. Form of knowledge organization, evaluation system:** final examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, multimedia presentations, equipment, reagents.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Industrial mushroom cultivation**

**2. Lecturer:** Teaching assistant , Yatsuk I.I.

**3. Status:** optional

**4. Year of education 4, semester 8**

**5. Credits – 3. Total number of academic hours - 108, including 48 practicals.**

**6. Previous conditions for studying:** courses ‘Systematics of Fungi’, ‘Methods of experimental mycology’

**7. Brief summary** The course is aimed on acquiring the modern technologies of edible and medicinal mushrooms cultivation on commercial scale.

The course objectives are to familiarize students with biological characteristics of certain species of macromycetes artificially grown for commercial purpose; to form an idea of the diversity of macromycetes cultivation technologies and practical skills to use them; to provide information about the most common and dangerous pathogens and pests which develop during industrial mushroom cultivation, as well as modern methods of restricting their harmfulness.

The course provides the acquisition of basic knowledge about macromycetes cultivated on industrial scale and their features; extensive and modern intensive cultivation technologies applied for different groups of macromycetes; organization and technical equipment of mushroom cultivation enterprises; methods of producing, propagating and storage of high-performance strains of fungi; composting technology and methods of determining the compost quality; pathogens and pests that develop during mushroom growing and methods that help to limit the yield loss.

During the studying students gain skills for optimal technology selection for artificial cultivation of different types of mushrooms; determining the species of most common and dangerous pathogens and pests which threat macromycetes during their commercial cultivation.

1. Technologies of obtaining the grain spawn.
2. Organization and equipment of cultivation laboratory.
3. Technologies of preparing compost mixtures.
4. Technologies of mushroom growing on compost.
5. Technologies of mushroom growing on wood.
6. Technologies of mushroom growing debris of herbaceous plants.
7. Features of obligate mycorrhizal fungi cultivation.
8. Diseases and pests of industrial cultivation.

**8. Form of knowledge organization, evaluation system:** Self-control. Current control – viva examination, tests. Final control is a written test.

**9. Teaching and methodological support:** Laboratory equipment, media and reagents, Internet resources, CD with the course program, scientific and educational literature, software for control of industrial conditions, scientific and methodological videos.

**10. Teaching language:** Ukrainian

**1. Name: Biodiversity and conservation of fungi.**

**2. Lectures:** Teaching assistant, Prylutskyi O.V.

**3. Status:** optional

**4. Year of education 4, semester 8**

**5. Credits – 3, Total number of academic hours – 48, including 48 practicals.**

**6. Previous conditions for studying:** курс “Систематика грибів”.

**7. Brief summary.** The aim of course is getting of the basic knowledge of biodiversity and conservation mycology and practical skills for applying of that knowledge.

Students may know the range of methods of analysis of biodiversity and reservations about their application, specific methods suitable for analysis of fungal diversity, the place and role of conservation of fungi in activities to protect nature in general, as well as approaches to the conservation of typical, rare and endangered species of fungi as well as their habitats.

Students should be able to: use the basic methods of analysis of biological diversity, able to adopt correct methods of analysis of fungal diversity, according to the specifics of the group and the problems correctly interpret obtained in the results of mycodiversity analysis, identify species of fungi and habitats protected in Ukraine to apply their new knowledge in practice environmental activities.

Course is divided onto following topics:

1. The modern theory of biodiversity and its importance
2. Basic mathematical methods for assessing biodiversity
3. Methods of studying the taxonomic structure and biota`s comparison
4. International practice in protection of rare and endangered species of fungi and their habitats
5. Methodological approaches to the organization of protection of fungi and their habitats in Ukraine

**8. Form of knowledge organization, evaluation system:** evaluation of practicals, written test. Final control - written test.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature.

**10. Teaching language:** Ukrainian

**ANNOTATIONS OF SPECIAL DISCIPLINES FOR MASTERS  
DEPARTMENT OF MYCOLOGY AND PLANT RESISTANCE**

**1.Name: Teaching methods in higher school.**

**2.Lecures:** Teaching assistant , Prylutskyi O.V.

**3.Status:** normative for specialities of biological faculty.

**4.Year of education 5, semester 9**

**5.Credits** – 3, Total number of academic hours – 18, including 18 lectures.

**6.Previous conditions for studying:** general cources dealing with psychology and teaching.

**7.Brief summary:** The aim of course is getting for students vision of a teaching in higher school and to reveal the contents of general, social and professional training of higher school lecturer.

Students should know the principles of teaching in higher school, forms and methods of educational process in HS, modern technology training in HS, forms and methods of control of students' knowledge, psychological and pedagogical aspects of teaching in Higher School.

As a result of the course students should be able to analyze educational materials and software for HS, choose optimal forms and methods of educational process and have them organize and plan their activities and independent work of students, to prepare the necessary visibility, educational and methodical literature for laboratory, practicals and seminars as well as lectures, know the control methods.

Course is divided onto following topics:

1. Development of education and didactics in higher school
2. The organization of educational process in higher school.

**8.Form of knowledge organization, evaluation system:** Evaluation of referats, written test and final written test.

**9.Teaching and methodological support:** CD with the course program and educational literature.

**10.Teaching language:** Ukrainian.

**1. Name: Methods and management of scientific research. Professional safety.**

**2. Lecures:** associated proffesor, Dr. Akulov O.Yu., Teaching assistant , Prylutskyi O.V.

**3. Status:** normative for specialities of biological faculty.

**4. Year of education 5, semester 2**

**5. Credits** – 3. Total number of academic hours – 33, including 11 lectures, 22 practicals.

**6. Previous conditions for studying:** General courses for biologists, Professional safety general course.

**7. Brief summary:** The aim of course is getting of the basic knowledge of methodologies, techniques and organization of research activities for their professional realization as researchers, as well as mastering the fundamentals of professional safety.

The objective of the course is to acquaint students with the basics of methodology of scientific knowledge and methodology of scientific research; improve the ability of students in searching and exploring scientific information at the exact formulation of goals, objectives and findings of the study; to form practical skills to issue a report on scientific research in the required form (thesis, article, book, essay, degree thesis, etc.). Also objective of the course is to acquaint students with the legal framework in the professional safety.

On the course completion students should know essence and main features of the scientific methods; the basic principles of scientific ethics; rules of organization and documentation of a scientific experiment or observation; modern methods of searching for scientific information and research funding; basic requirements for the preparation of scientific publications and academic degree works; the main indicators of the quality of the scientist. Also, students should know the system of organization of work in universities, industry organizations and manufacturing firms, the legal framework of investigation of accidents.

Students should be able to: select a challenge and formulate research; assess the

relevance and novelty of the subject matter of the study; formulate object and subject of study; seek the necessary scientific information; look for sources of funding for research; analyze and summarize the literature; participate in scientific discussions; formulate and test scientific hypotheses; select a set of techniques to study the chosen subject; the processing and interpretation of findings; present research results in the required form. Also, students should be able to organize work in specific academic, scientific and professional enterprises use safe means of operation of devices, equipment and reagents used safely, pesticides and other chemicals required to provide first aid in case of accidents.

**8. Form of knowledge organization, evaluation system:** Oral examination, creative tasks, written test, and evaluation of practicals. Final examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature.

**10. Teaching language:** Ukrainian.

**1.Name: Biological corrosion of materials**

**2.Lecturer:** lecturer Nedilko O.P.

**3.Status:** optional

**4.Year of education 5, semester 2**

**5.Credits – 3. Total number of academic hours - 33, including 24 lectures, 9 laboratory hours**

**6.Previous conditions for studying:** general courses ‘Microbiology’, ‘Applied mycology’, special practical course ‘Methods of experimental mycology’.

**7. Brief summary**

The course is aimed to familiarize students with the basic causes of biodamage and biological characteristics of its agents. During the special course students get a knowledge about mechanisms of damage, caused by biodestructors, changes of physical and chemical properties and technological parameters of building materials under the influence of metabolites of fungal mycelia, classification and characteristics of major groups of biocides.

Students are expected to know the basic trends of occurrence and development of biodamage process, aggressive metabolites of fungal mycelium - enzymes and organic acids, methods of biocides research and materials testing to fungal resistance, material protection from biodamage.

On completion of the course students ought to be able to reveal sites of fungal biodestruction on various materials, explore biocides using different methods and determine their fungicidal properties, be able to evaluate materials on fungal resistance and fungicide activity according to GOST and provide recommendations for material protection.

This discipline is divided onto following sections:

1. Biodamage of materials and products by microorganisms
2. Biocides – agents for protection from biodamage
3. Methods of materials testing to fungal resistance

**8. Form of knowledge organization, evaluation system:** evaluation of laboratory work, written tests. Final control – examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, multimedia presentations.

**10.Teaching language:** Ukrainian, Russian

**1.Name: Microbiological toxicology**

**2.Lecturer:** associate professor, Dr. Akulov O.Yu.

**3.Status:** optional

**4.Year of education 5, semester 2**

**5.Credits – 3. Total number of academic hours - 33, including 33 lectures**

**6.Previous conditions for studying:** courses 'Biochemistry', 'Plant physiology', 'Immunology', 'General and agricultural plant pathology'.

**7. Brief summary**

The main purpose of the course is to familiarize students with the major groups of toxins produced by microorganisms (bacteria, actinomycetes and fungi), and the role of these substances in producer organisms and human life.

The course is divided onto four key section: microorganisms-producers of antibiotics; food damage by fungi and mycotoxicosis incidence; bacterial food spoilage and associated food intoxication; mushroom toxins.

All sections covers the following topics: characteristics of toxin-producing microorganism; key chemical and physical properties of toxins; main target cells of toxins in affected organisms; molecular mechanisms of toxins; methodological basis of the organization of treatment of food intoxication caused by different types of toxins.

**8. Form of knowledge organization, evaluation system:** Evaluation of written control task, written tests after Section 1. Final control is a written test.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, multimedia presentations, lecture notes.

**10.Teaching language:** Ukrainian

**1. Name: Methods of systematics of fungi**

**2. Lecturer:** associate professor, Dr. Akulov O.Yu.

**3. Status:** optional

**4.Year of education 5, semester 1**

**5.Credits – 4. Total number of academic hours - 54, including 54 practicals.**

**6.Previous conditions for studying:** general biology knowledge, general mycology, systematics of fungi

**7. Brief summary** students are expected to learn modern methods of fungal taxonomy and get practical skills of their application. Methods of taxonomy and nomenclature of fungi are discussed separately. Particular attention is paid to the methods that have been recently introduced into the fungal taxonomy, including modern requirements to the fungal species name description in accordance with the Amsterdam Declaration.

**8. Form of knowledge organization, evaluation system:** Current control – control examinations. Final control is a written test.

**9. Teaching and methodological support:** multimedia presentations

**10.Teaching language:** Ukrainian

**1.Name:** Cytological Morphology of Fungi

**2. Lecturer:** Prof. Dr. Sci. (Biol.) Shckorbatov Yu.G.

**3. Status:** selective

**4. Year of education 5, semester 9**

**5. Credits - 2.5. Total number of academic hours - 44, including 44 practicals**

**6. Previous conditions for studying:** basic knowledge of general biology, cytology, organic and inorganic chemistry.

**7. Brief summary:** The purpose of the course - to acquaint students with the basics of genetics of fungi that is the specific and significant section of modern genetics. Objectives: To acquaint students with the general principles of the structural organization of the genome of fungi; to show the mechanisms of mutagenesis and DNA recombination in fungi; to give the basics of genetics of sexual cycle in fungi; to show the basics of genetics of aging in fungi; to give bases of the genetics of pathogenic fungi; to give main methods of selection in fungi that are the objects of biotechnology; to demonstrate the use of genetic techniques in taxonomy and phylogeny of fungi.

On completion of the course students should know: the principles of structural

organization of the genome in fungi; the main features of mutagenesis and DNA recombination in fungi; bases of sexual cycle in fungi; basics of genetics of aging and basics of genetics of pathogenic fungi; bases of genetics and breeding in fungi that are the objects of biotechnology; base principles of using of genetic techniques in taxonomy and phylogeny of fungi.

On completion of the course students will be able: to use current data of genetics to solve scientific problems of mycology; to use knowledge of the genetics of fungi in biotechnology; to use skills in Cytological Morphology of Fungi to solve the problems of Phytopathology.

**8. The form of a studies organization system and the method of knowledge evaluation:**

Current control - writing essays, surveys, assessment of the students work at the seminars. Form of Modular control is the checking tests. The final control is the credit test.

**9. Educational and methodological support:** computer presentations.

**10. Language:** Ukrainian.

**ANNOTATIONS OF SPECIAL DISCIPLINES FOR SPECIALISTS**  
**DEPARTMENT OF MYCOLOGY AND PLANT RESISTANCE**

**1.Name: Teaching methods in higher school**

**2.Lecures:** Teaching assistant , Prylutskyi O.V.

**3.Status:** normative for specialities of biological faculty.

**4.Year of education 5, semester 9**

**5.Credits – 3, Total number of academic hours – 18, including 18 lectures.**

**6.Previous conditions for studying:** general courses dealing with psychology and teaching.

**7.Brief summary:** The aim of course is getting for students vision of a teaching in higher school and to reveal the contents of general, social and professional training of higher school lecturer.

Students should know the principles of teaching in higher school, forms and methods of educational process in HS, modern technology training in HS, forms and methods of control of students' knowledge, psychological and pedagogical aspects of teaching in Higher School.

As a result of the course students should be able to analyze educational materials and software for HS, choose optimal forms and methods of educational process and have them organize and plan their activities and independent work of students, to prepare the necessary visibility, educational and methodical literature for laboratory, practicals and seminars as well as lectures, know the control methods.

Course is divided onto following topics:

3. Development of education and didactics in higher school
4. The organization of educational process in higher school.

**8.Form of knowledge organization, evaluation system:** Evaluation of referats, written test and final written test.

**9.Teaching and methodological support:** CD with the course program and educational literature.

**10.Teaching language:** Ukrainian.

**1.Name: Biological corrosion of materials**

**2.Lecturer:** lecturer Nedilko O.P.

**3.Status:** optional

**4.Year of education 5, semester 2**

**5.Credits – 3. Total number of academic hours - 20, including 14 lectures, 6 laboratory hours**

**6.Previous conditions for studying:** general courses 'Microbiology', 'Applied mycology', special practical course 'Methods of experimental mycology'.

**7. Brief summary**

The course is aimed to familiarize students with the basic causes of biodamage and biological characteristics of its agents. During the special course students get a knowledge about mechanisms of damage, caused by biodestructors, changes of physical and chemical properties and technological parameters of building materials under the influence of metabolites of fungal mycelia, classification and characteristics of major groups of biocides.

Students are expected to know the basic trends of occurrence and development of biodamage process, aggressive metabolites of fungal mycelium - enzymes and organic acids, methods of biocides research and materials testing to fungal resistance, material protection from biodamage.

On completion of the course students ought to be able to reveal sites of fungal biodestruction on various materials, explore biocides using different methods and determine their fungicidal properties, be able to evaluate materials on fungal resistance and fungicide activity according to GOST and provide recommendations for material

protection.

This discipline is divided onto following sections:

1. Biodamage of materials and products by microorganisms
2. Biocides – agents for protection from biodamage
3. Methods of materials testing to fungal resistance

**8. Form of knowledge organization, evaluation system:** evaluation of laboratory work, written tests. Final control – examination.

**9. Teaching and methodological support:** CD with the course program, scientific and educational literature, multimedia presentations.

**10. Teaching language:** Ukrainian, Russian

**1. Name: Methods of systematics of fungi**

**2. Lecturer:** associate professor, Dr. Akulov O. Yu.

**3. Status:** optional

**4. Year of education 5, semester 1**

**5. Credits – 4. Total number of academic hours - 54, including 54 practicals.**

**6. Previous conditions for studying:** general biology knowledge, general mycology, systematics of fungi

**7. Brief summary** within a special course students are expected to learn modern methods of fungal taxonomy and get practical skills of their application. Methods of taxonomy and nomenclature of fungi are discussed separately. Particular attention is paid to the methods that have been recently introduced into the fungal taxonomy, including modern requirements to the fungal species name description in accordance with the Amsterdam Declaration.

**8. Form of knowledge organization, evaluation system:** Current control – control examinations. Final control is a written test.

**9. Teaching and methodological support:** multimedia presentations

**10. Teaching language:** Ukrainian