**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**
**SUMY NATIONAL AGRARIAN UNIVERSITY**

**Department of Selection and Seeding named after Professor M.D. Goncharov**

**«APPROVED»**
**by Head of the Department**
**of Selection and Seeding named**
**after Professor M.D. Goncharov**
**«___»_____ 2019**
**_____Onychko V.I.**

# PROGRAM OF THE EDUCATIONAL DISCIPLINE

# ORGANIZATION OF SEEDLING

**PROGRAM SUBJECT AREA** ***201 "Agronomy"***
(code and specialty name)

**Faculty of Agrotechnology and Natural Resource Management**

**2019-2020 academic year**

Program on **Organization of Seed Management** for the postgraduates of Specialty 201 "Agronomy"

**The program is developed by**: Berdin S.I., Associate Professor

The program was approved at a meeting of the Department of Selection and Seeding named after Professor M.D. Goncharov

Minutes No. 21 dated 22.04.2019

**Head of the Department _____ Onychko V.I.**

**Agreed:**

Dean of the Faculty _____ **(Kovalenko I.M.)**

Methodist of educational department _____ **(H.O. Baboshyna)**

Registered in electronic database: date: _____ 2019

## 1. Description of the course

<table>
<tr><td rowspan="2">Indicators</td><td rowspan="2">Field of study, subject area, educational level</td><td colspan="2">Characteristics of the discipline</td></tr>
<tr><td>full-time education</td><td>evening form of training</td></tr>
<tr><td rowspan="2">Quantity of credits – 3,0</td><td>Field of study:<br>20 Agrarian Sciences and Foodstuffs</td><td colspan="2" rowspan="2">Normative</td></tr>
<tr><td>Subject area:<br>201 "Agronomy"</td></tr>
<tr><td>Quantity of modules – 2</td><td rowspan="7">Specialty:<br>201 "Agronomy"</td><td colspan="2">The year of training:</td></tr>
<tr><td>Quantity of content modules: 4</td><td>2019-2020</td><td>2019-2020</td></tr>
<tr><td rowspan="3"></td><td colspan="2">Course</td></tr>
<tr><td>2</td><td>2</td></tr>
<tr><td colspan="2">Semester</td></tr>
<tr><td rowspan="2">Total - 90</td><td>2</td><td>2</td></tr>
<tr><td colspan="2">Lectures</td></tr>
<tr><td rowspan="11">Weekly hours for full-time study: classroom - 3 individual work - 3</td><td rowspan="11">Educational level:<br>Doctor of Philosophy</td><td>44 hours</td><td>44 hours</td></tr>
<tr><td colspan="2">Practical classes, seminars</td></tr>
<tr><td>-</td><td>-</td></tr>
<tr><td colspan="2">Practical classes</td></tr>
<tr><td>44 hours</td><td>44 hours</td></tr>
<tr><td colspan="2">Individual work</td></tr>
<tr><td>16 hours</td><td>16 hours</td></tr>
<tr><td colspan="2">Consultations:</td></tr>
<tr><td>16 hours</td><td>16 hours</td></tr>
<tr><td colspan="2">Type of control:</td></tr>
<tr><td>Credit</td><td></td></tr>
</table>

***Note***. The ratio of hours of practical classes to individual and consultative work is (%):
for full-time education - 73% / 27% (88/32)
for evening education - 73% / 27% (88/32)

## 2. The purpose and objectives of the discipline

**The purpose** of teaching the discipline is: to instill to students the ability to critically analyze and evaluate modern scientific achievements, to generate new ideas in solving research and practical problems, in the field of seed production. Ability to critically analyze and evaluate modern scientific achievements, generate new ideas in solving research and practical problems, including using the latest information and communication technologies.

**Objectives:** to master postgraduates' knowledge in terms of organization of seed management, to form a scientist in the field of seed crops.

After studying the discipline, the postgraduate should

**know:** the essence of methods and techniques of research in the field of seed production, to understand the basic approaches to the formation of schemes of research in seed production.

**be able to:** form scientific work in seed production; develop and lay experiences in this direction; maintain scientific documentation; conduct processing of the received material; form scientific publications on seed production.

### General competencies that the postgraduate should master

| Code | General competencies |
|---|---|
| GC 1 | Ability to learn, master modern knowledge, self-improve and form a systematic scientific outlook. |
| GC 2 | Ability to critically analyze and evaluate modern scientific achievements, synthesis of holistic knowledge, complex problem solving. |
| GC 3 | Ability to abstract creative thinking, identify, receive, systematize, synthesize and analyze information from various sources with the use of modern information technologies in scientific activity. |
| GC 5 | Ability to generate new ideas and make informed decisions to achieve goals. |
| GC 8 | Ability to demonstrate initiative, responsibility, to motivate people and move toward a common goal. |
| GC 11 | Ability to prepare scholarly texts, present, discuss, debate and debate scientific results in their scientific work in national and foreign languages, to an extent sufficient for full understanding, demonstrating a culture of scientific verbal and written language. |

### Expected learning outcomes of the discipline

| Code | Program results |
|---|---|
| PR 1 | Possess modern advanced conceptual and methodological knowledge while performing research and / or professional activities and at the border of subject areas of knowledge. |
| PR 2 | Have a thorough knowledge of the subject area and understanding of the profession, knowledge of the works of leading domestic and foreign scientists, fundamental work in the field of research, to formulate the purpose of their own scientific research as a component of the civilization process. |
| PR 3 | Possess the principles of financial support for research work, structure of estimates for its implementation, preparation of the request for funding, preparation of |

| | |
|---|---|
| | reporting documentation. |
| PR 5 | To know the principles of organization, forms of realization of educational and scientific process in modern conditions, its scientific, educational-methodical and normative providing, working out of scientific and informational sources in preparation of lessons, use of active teaching methods. |
| PR 9 | Analyze scientific works, identifying debatable and under-researched issues, monitor scientific sources of information regarding a problem that is being investigated to establish their informational value through comparative analysis with other sources. |
| PR 14 | To use modern information and communication technologies in communication, information exchange, collection, analysis, processing, interpretation of sources. |
| PR 17 | Have the ability to act socially consciously and responsibly on the basis of ethical motives, to make informed decisions, to develop and self-improve. |

**The correlation of the discipline results with the program results**

| Competencies | PR 1 | PR 2 | PR 3 | PR 5 | PR 9 | PR 14 | PR 17 |
|---|---|---|---|---|---|---|---|
| GC 1 | * | | * | * | * | | * |
| GC 2 | | * | * | * | | * | * |
| GC 3 | * | * | * | * | | | |
| GC 4 | | * | * | * | * | | |
| GC 8 | * | | * | * | * | * | |
| GC 9 | * | | * | | * | * | * |

GC 1. Ability to formulate a scientific problem, develop working hypotheses, determine relevance, purpose, tasks that need to be accomplished to achieve the goal, evaluate the resources needed and time to implement, which involves a deep rethinking of existing and creating new holistic knowledge and / or professional practice.
GC 2. Ability to integrate research into agro-production and agronomy.
GC 3. Ability to have information on the current state and tendencies of development of world and domestic agro-technologies of cultivation of crops.
GC 4. Ability to formalize specialized applied problems in the field of agro-industrial testing, to algorithmize them.
GC 8. Ability to process the obtained experimental data, establish analytical and statistical relationships between them and the studied parameters based on the use of standard mathematical packages of information processing.
GC 9. Ability to develop a system of experimental research to practically confirm theoretical assumptions and to implement it in the agro-technological process.

## 4. Structure of the discipline

| Title of content modules and themes | Quantity of hours | | | |
|---|---|---|---|---|
| | Full-time and evening forms of training | | | |
| | Total | including | | |
| | | lectures | Laboratory work | Individual work, consultations |
| **Module 1. General Approaches to Seed Research** | | | | |
| ***Content Module 1.*** **Formation of Seed Research Work** | | | | |
| **Theme 1.** ***Introduction to the course*** | 6 | 2 | 4 | |
| **Theme 2.** Formation of Seed Research Work in the field of seed production in Ukraine | 6 | 2 | | 4 |
| **Theme 3.** Foreign experience in the formation of seed production scientific thought | 6 | 2 | 2 | 2 |
| **Total for content Module 1** | **18** | **6** | **6** | **6** |
| ***Content Module 2. General methods and methodology of researches in seed production*** | | | | |
| **Theme 4.** General methods of researches in seed production. | 14 | 8 | 4 | 2 |
| **Theme 5.** Use of modern information and communication technologies in seed production. | 4 | 2 | | 2 |
| **Theme 6.** Researches in seeds. | 12 | 6 | 4 | 2 |
| **Theme 7.** Researches on the improvement of soil variety control techniques | 4 | 2 | | 2 |
| **Total for content Module 2** | **34** | **18** | **8** | **8** |
| **Total for Module 1** | ***52*** | ***24*** | ***14*** | ***14*** |
| **Module 2. Researches in the special seed production of primary seedbeds** | | | | |
| ***Content Module 3.*** **Researches in seed production of primary seedbeds of grain crops, legumes and cereals.** | | | | |
| **Theme 8.** Researches in seed production of primary seedbeds of self-pollinated crops | 12 | 2 | 6 | 4 |
| **Theme 9.** Researches in seed production of primary seedbeds of cross-pollinated crops | 12 | 2 | 6 | 4 |
| **Total for content Module 3** | **24** | **4** | **12** | **8** |
| ***Content Module 4.*** **Researches in seed production of primary seedbeds of industrial and fodder crops.** | | | | |
| **Theme 10.** Researches in seed production of primary seedbeds of potatoes | 16 | 6 | 6 | 4 |
| **Theme 11.** Researches in seed production of primary seedbeds to produce hybrids | 12 | 6 | 4 | 2 |
| **Theme 12 .** Researches in seed production of primary seedbeds of flax and hemp | 8 | 2 | 4 | 2 |
| **Theme 13 .** Researches in seed production of primary seedbeds of fodder herbs | 8 | 2 | 4 | 2 |
| **Total for content Module 4** | **44** | **16** | **18** | **10** |
| **Total for Module 2** | ***68*** | ***20*** | ***30*** | ***18*** |
| **Individual tasks** | | | | |
| **Total** | ***120*** | ***44*** | ***44*** | ***32*** |

## 5. Themes and plan of lectures

| Order number | Theme title and plan | Quantity of hours |
|---|---|---|
| 1 | **Theme 1. Introduction to the course.**<br>*1. History of seed production in Ukraine*<br>*2. Problems that are solved by seed production*<br>*3. The main issues under investigation in seed production*<br>*4. Methods of research in seed production* | 2 |
| 2 | **Theme 2. Formation of seed research work in the field of seed production in Ukraine**<br>*1. History of the development of research work in seed production in Ukraine*<br>*2. Modern organization of seed production in Ukraine as a social result of research work*<br>*3. Researches on sorting and sorting updates* | 2 |
| | **Theme 3. Foreign experience in the formation of seed production scientific thought**<br>*1. History of the development of research work in seed production abroad*<br>*2. The modern organization of seed production in the USA.*<br>*3. Modern organization of seed production in the EU countries*<br>*4. Modern organization of seed production in other foreign countries.* | 2 |
| 4 | **Themes 4. General methods of researches in seed production**<br>*1. Field methods of research in seed production*<br>*2. Laboratory methods*<br>*3. Mathematical modeling and statistical methods of research* | 2 |
| 5 | **Theme 5. Schemes of field experiments in seed production in the context of crops.**<br>*1. Field experiments for self-pollinated crops*<br>*2. Field experiments for cross-pollination crops*<br>*4. Field experiments for vegetatively propagating crops*<br>*5. Field experiments for obtaining seeds on a hybrid basis* | 2 |
| 6 | **Theme 6. Biological and economic principles of cultivation structure improvement and seed production of grain crops**<br>*1. Ecological studies on varietal response to growing conditions.*<br>*3. Research on accelerated introduction of varieties and hybrids*<br>*2. Research on the economic efficiency of the introduction and use of the variety* | 2 |
| 7 | **Theme 7. Biophysical methods of research in seed production. Technological requirements for soil control.**<br>*1. Gas discharge visualization (GDV) method*<br>*2. Method of microfocal projection radiography*<br>*3. The method of computer microtomography*<br>*4. The method of laser photometry*<br>*5. Magnetic resonance imaging method*<br>*6. Magnetic resonance imaging method*<br>*7. Multispectral imaging method*<br>*8. X-ray method* | 2 |

| Order number | Theme title and plan | Quantity of hours |
|---|---|---|
| 8 | **Theme 8. Use of modern information and communication technologies in seed production.**<br>*1. Researches on the development and use of seed production research software.*<br>*2. Using equipment to visualize processes or digitize research results*<br>*3. Use of global computer networks for the publication of scientific papers.* | 2 |
| 9 | **Theme 9. Research of the effect of pre-sowing on the productivity of crops.**<br>*1. Research on the effect of the agents.*<br>*2. Research on the effects of inoculants.*<br>*3. Investigation of thermal and other physical effects on seeds* | 2 |
| 10 | **Theme 10. Research on the impact of schemes and methods of harvesting on seed quality.**<br>*1. Research on the collection of simultaneous ripening crops*<br>*2. Research on the collection of crops of different maturation*<br>*3. Research on the harvesting of vegetatively propagated and biennial crops* | 2 |
| 11 | **Theme 11. Research on the impact of post-harvest cultivation and storage on quality seed indicators**<br>*1. Seeds of grain crops*<br>*2. Seeds of legumes*<br>*3. Seeds of herbs and small-seed crops*<br>*4. Potato seeds* | 2 |
| 12 | **Тема 12. Research on the improvement of variety control techniques**<br>*1. Improvement of methods of sampling of seeds*<br>*2. Assessment of the efficiency of sowing methods while conducting soil varietal control for characterization of economically valuable traits of crops*<br>*3. Comparative assessment of varietal uniformity of seed lots* | 2 |
| 13 | **Theme 13. Research in seed production of primary seedbeds of self-pollinated grain crops and legumes.**<br>*1. Methods and schemes of reproduction of elite cultures*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 14 | **Theme 14. Research in seed production of primary seedbeds of cross-pollinated grain crops and buckwheat**<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 15 | **Theme 15. Research in seed production of primary seedbeds of clones and clone units of potatoes.**<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |

| Order number | Theme title and plan | Quantity of hours |
|---|---|---|
| 16 | **Theme 16. Research in seed production of primary seedbeds of potato meristem.**<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 17 | **Theme 17. Research in seed production of primary seedbeds of potato, obtained from seeds of natural seeds.**<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 18 | **Theme 18. Research in seed production of primary seedbeds of hybrids of maize**<br>*1. Methods and schemes of reproduction of the source material of the crop*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 19 | **Theme 19. Research in seed production of primary seedbeds of hybrids of sunflower and rapeseed**<br>*1. Methods and schemes of reproduction of the source material of the crop*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 20 | **Theme 20. Research in seed production of primary seedbeds of hybrids of sugar and fodder beets.**<br>*1. Methods and schemes of reproduction of the source material of the crop*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 21 | **Theme 21. Research in seed production of primary seedbeds of hybrids of flax and hemp.**<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| 22 | **Theme 22. Research in seed production of primary seedbeds of hybrids of fodder herbs**.<br>*1. Methods and schemes of reproduction of crops elite*<br>*2. Comparative techniques for the effectiveness of the proposed methods and schemes of primary seed production* | 2 |
| **Total:** | | **44** |

## 6. Theme title and laboratory work

| Order number | Theme title and plan | Quantity of hours |
|---|---|---|
| 1 | Discussion of problematic questions on the research in the field of seed production. | 4 |
| 2 | Features of terminology application in seed production. | 2 |
| 3 | Basic research questions in seed production abroad (presentation defense). | 2 |

| | | |
|---|---|---|
| 4 | Development and defense of field experiments in seed production. | 4 |
| 5 | Optimization of varietal composition of a certain culture according to given parameters. | 2 |
| 6 | A prominent biophysical method of seed research (presentation defense). | 2 |
| 7 | Methods and techniques of seed treatment. | 2 |
| 8 | The influence of schemes and methods of harvesting on the quality of seeds of a particular crop (presentation defense). | 2 |
| 9 | Development of a scheme of finishing of seeds of a certain culture (presentation defense). | 2 |
| 10 | Development of the scheme of planting and storage of seeds of a certain crop (presentation defense). | 2 |
| 11 | Formation of the scheme, methods of research in the seed of primary seedbeds of a certain crop | 2 |
| 12 | Formation of data on own seed research | 4 |
| 13 | Processing the results of research in seed production | 6 |
| 14 | Preparation of a scientific publication on the results of research in the field of seed production | 8 |
| **Total:** | | **44** |

## 7. Individual work and consultations

| Order number | Title and content of Modules and their components | Quantity of hours |
|---|---|---|
| 1. | Formation of seed research work in the field of seed production in Ukraine | 4 |
| 2. | Foreign experience in the formation of seed production scientific thought | 2 |
| 3. | General methods of research in seed production. | 2 |
| 4. | Using modern information and communication technologies in seed production | 2 |
| 5. | Research on seeds | 2 |
| 6. | Research on the improvement of soil variety control techniques | 2 |
| 7 | Research in seed production of primary seedbeds of self-pollinated crops | 4 |
| 8 | Research in the seed production of primary seedbeds of cross-pollinated crops | 4 |
| 9 | Research in the seed production of primary potato seedbeds | 4 |
| 10 | Research in the seed production of primary nurseries for hybrids | 2 |
| 11 | Research in the seed production of primary flax and hemp seedlings | 2 |
| 12 | Research in the seed production of primary seedbeds for fodder grasses | 2 |
| **Total:** | | **32** |

## 8. Methods of teaching

**1. Methods of teaching by source of knowledge:**

1.1 ***Verbal:*** telling, explanation, conversation (heuristic and reproductive), lecture, coaching, working with a book (reading, translating, writing, planning, reviewing, summarizing, drawing up tables, graphs, supporting notes, etc.).

1.2. Visual: demonstration, illustration.

1.3. ***Practical***: laboratory method,

**2. Methods of teaching by the nature of logic of knowledge.**

2.1.***Analytical***

**3. Methods of teaching by the nature and level of individual mental ability of postgraduates.**

3.1. ***Problematic***

3.2. ***Partial search (heuristic)***

**4. Active teaching method**s – the use of technical training tools, brainstorming, the use of training and control tests, the use of basic lecture notes.

**5. Interactive learning technologies** – use of multimedia technologies, interactive whiteboard and spreadsheets.

In case of small groups the following teaching methods are used:

**Personalized Learning**

**Differentiated Instruction**

**Inquiry-based Learning**

**9. Control methods**

1. Rating control over a 100-point ECTS rating scale.

2. Conducting intermediate control during the semester (intermediate attestation).

3. Multicriteria assessment of postgraduate' current work:

- results and defence of laboratory work;
- self-study of the topic as a whole or individual issues;
- fulfillment of analytical and calculation tasks;
- test results.

Assessment of the postgraduate is carried out by the commission (the committee includes members of the department)

## 10. Distribution of points that postgraduates receive (full-time education)

| Current testing and individual work | | | | | | IW | Total for Modules and individual work | Attestation | Total |
|---|---|---|---|---|---|---|---|---|---|
| Module 1 25 points | | | | Module 2 45 points | | | | | |
| Content Module 1 (5 points) | Content Module 2 (10 points) | Content Module 3 (10 points) | | Content Module 4 (45 points) | | | | | |
| T1 | T2 | T3 | T4 | T5 | T6 | 15 | 85 15+70 | 15 | 100 |
| 5 | 10 | 5 | 5 | 20 | 25 | | | | |

## 10. Rating scale: national and ECTS

| Total points for all activities | ECTS grade | Rating on a national scale |
|---|---|---|
| | | For exam |
| 90 – 100 | A | excellent |
| 82-89 | B | good |
| 75-81 | C | |
| 64-73 | D | satisfactorily |
| 60-63 | E | |
| 35-59 | FX | satisfactorily |
| 0-34 | F | unsatisfactory with the possibility of reassembly unsatisfactory with the compulsory re-study of the discipline |

## 11. Recommended references

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**Accessory References**

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